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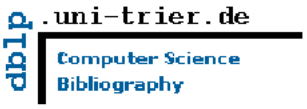
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IDS execute on the standard KDD'99 (knowledge Discovery and Data Mining) Data set; this data set is used for measuring the performance of intrusion detection systems. Proposed system can detect the intrusions and classify them into four categories: Probe, Denial of Service (DoS), U2R (User to Root), and R2L (Remote to Local). A presented experiment results is carried out to the performance of the proposed IDS using KDD 99' dataset. Its shows that the proposed IDS performed better in term of accuracy, and efficiency.

Keywords— Internet; Intrusion detection; Data mining; Clustering, Classification, Data preprocessing.

4. Paper 31051412: Macro Variable Predictive Model in Determining Susceptibility Regions using Combined Methods of Double Exponential Smoothing and Fuzzy MCDM (Case Study: Central Java Province) (pp. 20-28)

Alessandro C. Baramuli, Faculty of Information Technology, Satya Wacana Christian University Diponegoro Street, 52-60, Salatiga, 50711, Indonesia
Sri Yulianto J. P., Faculty of Information Technology, Satya Wacana Christian University, Diponegoro Street, 52-60, Salatiga, 50711, Indonesia
Kristoko D. Hartomo, Faculty of Information Technology, Satya Wacana Christian University, Diponegoro Street, 52-60, Salatiga, 50711, Indonesia

Abstract — The problem of regions that are vulnerable to be poor has been a particular concern in Central Java Province. One important aspect to support the reduction of regions that are vulnerable to be poor is the availability of accurate data. This study aims to provide an alternative solution by creating a predictive model of macro variable to determine areas which are vulnerable to be poor in the region of Central Java Province, which has poor population of as many as 4,704,870 people, with 14.44 percent of poor people in September 2013. The prediction model built is using combination methods of Double Exponential Smoothing (DES) and Fuzzy MCDM (FMCDM). DES method is used to predict the macro variable which is the rate percentage of the school of 7-12 years enrollment, the rate percentage of the school of 12-15 years enrollment, the percentage of the population working in the informal sector, the percentage of population working in the formal sector, and the percentage of contraceptive users. The validation results of the predictions are done by the approaches of MAPE, MSE and MAD. To determine the areas that are vulnerable to be poor, the macro variables data of the prediction results will be evaluated using the FMCDM method. The result of this study is a model that can provide visualization of predicted regions that are vulnerable to be poor in Central Java to the stakeholders as decision makers, by utilizing information technology that is based on geographic information systems, and is expected to assist in the planning of countermeasuring regions that are vulnerable to be poor.

Keywords— Prediction, Double Exponential Smoothing, Validation, Fuzzy MCDM, Poverty, Vulnerability.

5. Paper 31051416: The control model of security in the deployment of ERP systems (pp. 29-35)

Setare Yaghubi, Department of Computer, Zanjan Branch, Islamic Azad University, Zanjan, Iran
Nasser modiri, Assoc. Prof, Department of Computer, Zanjan Branch, Islamic Azad University, Zanjan, Iran

Abstract - Systems ERP software packages are vast and its implementation is facing with many complexity and challenges. The successful implementation of ERP in an organization depends on many factors. The successful implementation of ERP in an organization depends on many factors. This is very important in case of ERP systems due to the specific nature and affect all processes and activities of the organization. With the development of Web-based software to Smart invasions need to improve security during the implementation process there is. In this study reviews key success factors in ERP systems implementation methodologies and factors are discussed, and an approach to improve security during critical phases of implementation are proposed.

Keywords: methodologies implementation of systems ERP, ERP Security Control, CSF, AIM, ASAP

6. Paper 31051417: A Survey of Power Management Techniques of Computing Systems (pp. 36-39)

Valma Prifti, Polytechnic Unviersity of Tirana, Mechanical Faculty
Igli Tafa & Suida Ajdini, Faculty of Information Technology, Polytechnic University of Tirana

Abstract - All we know that in our days, battery lifetime is an important feature of personal computers, smart phones, tablets, i-pads etc. Consequently power consumption is becoming a big economical and ecological problem in IT industry. According to EPA, for every 1000 Kwh consumed electricity, is generated 0.73 tons CO_2 [1]. Consequently It produces huge environment pollution. In this paper we review some techniques to decrease as much as we can power consumption while having the minimum of impact in our CPU performance.

Key words: CPU power consumption, power reducing, power management techniques, high performance computing, minimizing energy consumption, dynamic voltage scaling

7. Paper 31051420: Business Type Classification via E-commerce Stage Model in Oil Industry in Iran (pp. 40-47)

Mohammad Nassiry, Faculty of Information Science & Technology, University Kebangsaan Malaysia, Tehran, Iran
Prof. Dr. Muriati Mukhtar, Faculty of Information Science & Technology, University Kebangsaan Malaysia Kuala Lumpur, Malaysia

Abstract — Since the strategies and plans for e-commerce development are different for different industries and since the oil industry is one of the most important industries in Iran, the scope of this research is thus confined to that of the oil industry in Iran. The main aim of this study is to identify and classify the different features of e-commerce development stages and features based on the different business types present in companies in the oil industry in Iran. In order to achieve both of these objectives a questionnaire was developed and administered online. The questionnaire was distributed to forty representatives working in different companies. The collected data was classified and sorted and the priority e-commerce features was classified and displayed as triangles for each business type. Furthermore, the experts were asked to indicate the features which they implemented in their companies in order to know the most used features in each stage. The results of this study give an insight to the practice of e-commerce for Iranian oil companies and can be used to strategize future directions for the industry in terms of e-commerce.

Keywords-component; E-commerce, E-business Model, E-commerce Stage Model, Business Types, Oil Industry

8. Paper 31051424: Vulnerability analysis of E-transactions in the Banking Industry, with a specific reference to malwares and types of attacks (pp. 48-54)

Mrs T. K. George & Dr. (Prof) Paulose Jacob, Dept. of Computer Science, Cochin University of Science and Technology

Abstract - One of the most important features of E-banking is to deliver the new banking services & products to the extended customer database by the effective use of internet technology with a lesser transaction cost and without the traditional constraints on time and place. E-banking makes use of computers and related technologies to retrieve and process the transactions with a bank or other financial service providers. In order to reduce the potential vulnerabilities against the security, many vendors have developed various solutions in both software-based and hardware-based systems. Finding a solution, to patch up security holes, is a quintessential element for the future of the banking Industry.

Key words: E-banking, transactions, constraints, patch, security, Vulnerability

9. Paper 31081317: Hybrid Encryption Technique Using RSA with SHA-1 Algorithm in Data-At-Rest and Data-In-Motion Level (pp. 55-61)

Aarthi.G, Mother Therasa Women University, Kodaikanal, Tamil Nadu, India.
Dr. E. Ramaraj, Dept. Of Computer Sci.& Engg., Alagappa University,Karaikudi, Tamil Nadu, India.

Abstract - Data base security is the mechanisms that protect the data base against intentional or accidental threats. It is also a specialty within the broader discipline of computer security using encryption techniques. Encryption is one of the security methods in database security. To secure the data, it is an essential to propose a new methodology to avoid such kind of attacks for securing the data-at-rest and data-in-motion level. This paper proposes a hybrid encryption technique for secure the database. The proposed hybrid encryption technique used to secure data-at-rest and data-in-motion level with RSA and SHA-1algorithms that led to strong security. The aim of the proposed hybrid encryption technique is to provide better confidentiality, integrity and availability among other security protocols.

Keywords- Data-at-rest; Data-in-motion; RSA; SHA-1; Hybrid Encryption.

10. Paper 31041413: Efficiency Analysis of Materialized views in Data Warehouse Using Self-maintenance (pp. 62-66)

Mehwish Aziz, Govt Post Graduate College, S/town, Rawalpindi
Shabnam Nawaz, Govt Post Graduate College, S/town, Rawalpindi
Pakeeza Batool, Govt Post Graduate College, S/town, Rawalpindi, Department of Information Technology

Abstract — A data warehouse is a large data repository for the purpose of analysis and decision making in organizations. To improve the query performance and to get fast access to the data, data is stored as materialized views (MV) in the data warehouse. When data at source gets updated, the materialized views also need to be updated. In this paper, we focus on the problem of maintenance of these materialized views and address the issue of finding such auxiliary views (AV) that together with the materialized views make the data self-maintainable and take minimal space. We propose an algorithm that uses key and referential constraints which reduces the total number of tuples in auxiliary views and uses idea of information sharing between these auxiliary views to further reduce number of auxiliary views.

Keywords—Materialized views (MV), Auxiliary views (AVs), Referential integrity (RI).

11. Paper 31051429: Heart Disease Diagnosis by Using FFBP and GRNN Algorithm of Neural Network (pp. 67-72)

Shaikh Abdul Hannan, Department of Computer Science and IT, Albaha University, Albaha, Saudi Arabia

Abstract - An expert system is a computer program that simulates the thought process of a human expert to solve complex decision problems. The growth of expert systems is expected to continue for several years. In the last two decades, the use of Neural Network in medical analysis is increasing. This is mainly because the classification and detection system have improved a great deal to help the medical experts in diagnosing. Heart disease affects millions of people every year. As clinical decision making inherently requires reasoning under uncertainty, expert system and Neural Network technique are suitable for dealing with partial evidence. Medical trainee doctors other than specialist may not have enough expertise or experience to deal with certain high risk diseases. With this system the patients with high risk factors can recover. In this paper, the detail about patient data collection procedure, coding, normalization and tabulation is given. The experiments are perform on data collected using Feed-forward Backpropagation. In this work around 300 patients information has been collected from Sahara Hospital, Aurangabad under the observation of Dr. Abdul Jabbar. For data collection of 350 patients around 9 months has spend by sitting in OPD of Hospital along with concerned doctor. The final coded, normalized and tabulated data and results has been verified by Dr. Abdul Jabbar and is satisfied with the result.

Keywords: Expert System, ANN (Artificial Neural network), FFBP (Feed forward backpropagation algorithm), Generalized Regression Neural Network, Medicine, Symptoms.

Fault Tolerance Mechanisms for Wireless Sensor Networks

Youness LYAZIDI*, Ahmed KAMIL[#], Amina MERBAH[#], Hicham BELHADAOUI[#], Mohamed OUZZIF[#]

[#]GI Department, RITM-ESTC / CED-ENSEM, University Hassan II
Km 7, Eljadida Street, B.P. 8012 Oasis, Casablanca, Morocco
*LEC – EMI, Rabat, Morocco

Abstract-- Wireless Sensor Networks have become a new information collection and monitoring solution for several applications. The failure of sensor node is either because of communication device failure, battery or the harsh environment where the sensor node is deployed and sensor device related problems. In order to maintain the high quality of WSN (Wireless Sensor Network), detection of failed or malfunctioning sensor node is essential to avoid further degradation of the service. This paper presents a new method to detect the sensor node failure or malfunctioning related to a specific platform for collecting data in wsn. We propose a localized fault detection method to identify the faulty sensors specific to each case of failure related to the platform. The method consists on a localized fault detection algorithm to identify the faulty sensors. In a large scale the complexity of the algorithm became high. Simulation results show that the algorithm can clearly identify the faulty sensors and faulty zones with high accuracy and lightly influence the energy consumptions of participated sensor nodes.

Keywords--- WSN, Fault tolerance, errors detection

I. INTRODUCTION

Queue management and transmission time during operation of sensor nodes, help to extend the lifetime of WSNs applications. Fault tolerance is the ability of a system to provide a desired level of functionalities. Furthermore the presence of faults affects the overall task of the network [1]. The sensor nodes are prone to failure, consequently fault tolerance should be seriously considered in many applications of sensor networks. Today several studies have been performed to treat those points in a WSN [2].

The sensor nodes are very sensitive and prone to failures due to energy depletion, hardware failures, and errors in communication links, malicious attacks and others. However, it is imperative to design the strategy of fault tolerance in a WSN. The overall functionality of a sensor network must be maintained without interruption despite the unexpected errors, and sensor nodes must provide the level of reliability required. We showed in the section of evaluation of protocol ERVM [9] a better rate of energy consumption compared to other protocols.

ERVM's a routing protocol adapted to the VMLI infrastructure [10]. The design adopted is simple to deliver the packets to their destination with the minimum delay. The principal aim of this protocol is its simplicity, and the choice of the correct route with the least charges and the maximization of the life time of the network. The ERVM protocol was inspired for making a simple solution to routing in wireless sensor networks, which has very less complexity and is easy to implement, while making it energy-efficient.

Due to these advantages, we thought to develop methods and strategies for fault-tolerant, and give birth to a reliable and safe application in terms of functioning (monitoring and delivery of urgent packets). Thus, the application must be available in the best conditions.

The article is organized in the following way. Section 2 is a study and critical analysis of fault tolerance in the different layers, then it describes the general procedure for fault tolerance in a WSN, the section describes some motivations and our contribution developed. The section 3 presents the proposed solutions to improve the functioning of VMLI application [9] on the management of the queue connection of sensor nodes, because the waiting time for activation of a sensor node is the longest compared to other network devices, we define also a set of processing module of increased reliability in various scenarios, beginning with the detection of individual cases of breakdowns in the system. Section 4 deals with experimental work and presents related simulation results. Finally section 6 concludes the proposed work and suggests several ideas for future undertaking.

II. REVIEW AND MOTIVATIONS

A. Fault tolerance at different levels :

Five levels of fault tolerance have been discussed in [2]. Physical layer, hardware layer, soft layer, middleware layer, and application layer. Based on this study, we classify the fault tolerance in sensor networks into four levels, from the point of view of the system. More specifically, the fault tolerance in a wireless sensor networks is related to material layer, soft layer, network layer, and application layer.

1) Physical layer:

The physical layer is responsible for establishing communication in a given medium between two nodes. Typical tasks at this level include modulation-demodulation, and encoding-decoding. Traditionally fully hardwired solutions have been used in order to minimize the cost and maximize the energy efficiency. A software radio is a wireless communication device in which parts or

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all of the physical layer functions are realized in software [3].

2) Hardware layer

Software radios are a way to extend programmability into the physical layer and to enable adaptation to channel conditions. It has been demonstrated that adaptive link layer techniques can significantly improve the performance of wireless networks. The first commercially available radio was the speakeasy device. Comprehensive surveys about software radios and related technologies have been conducted. Currently, the major commercial application driver is incompatibility between the number of cellular and PCS communication standards. The primary reason for deployment of hardware and software radios has been to solve interoperability problems and to enhance performances in noisy media; however, they are also ideally suited for realization of a variety of fault tolerance techniques at the physical layer. For example, if some components of the software radio are not functional, one can switch to modulation and encoding schemes that can be realized with the still operational hardware resources. Adaptation to noise characteristics can also be considered from the fault tolerance point of view.

3) Software layer

System software consists of the operating system (OS) and utility programs. Fault tolerance at the system software level can be addressed in several ways with respect to the computational subsystem [4].

Probably the most promising is through software diversity: each program is implemented in *n* different versions in hope that different versions will not have identical bugs [5]. The subsystem that can most benefit from fault tolerance realized at the system software level is the communication unit. For example, one can reroute messages using different paths in the multihop network. With respect to sensors and actuators, the most important piece of system software is the one related to calibration. Recently, a number of schemes have been proposed for this task [6, 7]. A very important component of system software is the one that supports distributed and simultaneous execution of localized algorithms.

4) Network Layer

At the system software level, in addition to the OS of the individual nodes, networking (communication) plays the most dominant role. Starting with the middleware level, emphasis is shifted toward data aggregation, data filtering, and sensor fusion. These are tasks mainly related to sensor readings. Because it is difficult to provide fault tolerance in an economic way at the level of a single sensor, numerous faul tolerant approaches for this task will appear at the middleware level. Although currently the majority of applications are very simple, in order to address real-life applications, it is necessary to develop much more complex middleware. In order to combat software faults, *n* versioning is one of the options [2, 3].

5) Application Layer

Finally, fault tolerance can be addressed at the application level. For example, to identify a particular person, one can use sensors try to measure a variety of biometric features of that person. Each feature and possibly a combination of features will be sufficient to identify that person. Addressing fault tolerance at the application level may be very efficient; unfortunately, any given application will require a customized way in which to address the issue. On the other hand, an additional advantage of application-level fault tolerance is that it can be used to address faults in essentially any type of resource.

B. Classification protocols fault tolerance:

Fault-tolerant protocols can be viewed from several different angles. Therefore, a set of criteria is defined for the classification. We cite, among others, two main categories, namely temporal and architectural classifications.

1) Temporal classification

In the temporal classification, we divide all algorithms into two categories according to the treatment phase. If the treatment is performed before the failure, so we talk about preventive algorithms. Otherwise, the algorithms are called curative:

- **Preventive algorithm**: implements technical fault tolerant trying to delay or avoid any type of error to keep the network working as long as possible. The energy conservation for example, uses less energy and thus avoids premature extinction of the battery thereby increasing the lifetime of the nodes.

- **Curative algorithm**: uses an optimistic approach, where the mechanism of fault tolerance that is implemented is executed after the fault detection. For this, several algorithms recovery after failures is proposed in the literature, eg recovery of routing path, the election of a new aggregator, etc...

2) Architectural classification

This classification treats different types of component management, at the sensor individually or across the network. We distinguish three main categories:

a. Battery management

This category is considered as a preventive approach, where protocols define a uniform distribution of energy dissipation between sensor nodes to better manage energy consumption and increase the lifetime of the network. Furthermore, the mechanism is a standby battery management technique. Indeed, protocols determine deadlines standby of the inactive sensors nodes for better energy conservation.

b. Workflow

This category includes techniques that define management protocols data transfer (routing, selection of the transmission channel, etc...). We can find preventive or curative approaches on different layers (network, data link, etc...). Such as:

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- **Multipath routing:** multipath routing: uses a preventive algorithm for determining multiple paths from each sensor to the collector node. This ensures the presence of a more reliable path for transmission and provides a quick resumption of transfer in case of failure on the primary path by choosing one of the paths that remain.
- **Recovery road**: after failure detection, a curative technique used to create a new path that is the most reliable way to transmit data.
- **Channel allocation**: this solution is implemented at the MAC layer. It allows allocation of the transmission channel in a manner to reduce interference between neighboring nodes and avoid collisions during transfer.
- **Mobility**: some protocols offer as a solution for fault tolerance, the selection of a set of mobile nodes responsible for moving between the sensors to collect data. This will reduce energy consumption at each sensor by removing the transmission task. A mobile node usually has a greater than that of a sensor node battery.

c. Data management

Protocols in this category provide better data management and their treatment. Two main sub-categories are defined:

- **Aggregation**: considered preventive approach, the aggregation operation performs additional processing on the raw data collected from the environment. An aggregator node combines data from multiple nodes into meaningful information. This significantly reduces the amount of data transmitted by consuming less energy for their dissemination. Therefore, this increases the lifetime of the network.

- **Clustering**: An important approach to treat the structure of a sensor network is the clustering. It allows the formation of a virtual backbone which improves the utilization of scarce resources such as bandwidth and power. Moreover, clustering helps to achieve multiplexing between different clusters. In addition, it improves the performance of routing algorithms. Several protocols use this preventive approach and sometimes it is considered as a curative approach.

C. Motivations:

We briefly presented in the previous in paragraphs *A* and *B*, the basic level of fault tolerance in sensor networks. This partitioning for a resolution of faults in different levels, allows us a better rate of desired reliability of the application, with a very safe investment cost for fault tolerance which differs from one layer to another.

For both hardware and software layers, errors in the first level are connected to the physical node failures in sensors, due to manufacturing constraints or environments factors, for the second layer, these faults are always related to the software system in sensor nodes or middleware, hence the solution offers by these two levels is very expensive. In the network layer, errors are due to errors in wireless communications, of which some solutions that use error correction schemes and retransmission were adopted. For the application layer, the various solutions proposed are based on the choice of routing protocol specifically adapted to a specific application to remedy the failures.

This analysis allowed us to think about solutions for fault tolerance under VMLI architecture [10], By using the methods that we have developed to mount the proposed routing protocol ERVM[9]. Then propose algorithms based on temporal classifications, such as preventive algorithms to avoid any type of error in order to maintain the operation of a process as long as possible, and architectural classifications that meet several managements namely: management of battery that we have adopted to the method designed to ensure global coverage in our architecture, in a way that handles well the energy consumption, workflow management and data management through the coordinators nodes that have priority in terms of access and service life.

III. CONTRIBUTION

A. Queue management for activation of a sensor node

Accordingly to the VMLI infrastructure [10]. It turned out that the cost of a connection of a sensor node is the highest in some cases, compared to other nodes deployed in the network. We consider that this may cause a depletion of energy if the waiting time has increased. However, we consider this as a fault of the system, why we study the following proposal to tolerate this kind of defects, even if they do not prevent the process of connecting the sensor node. We identified three operations which may be continued during the activation request of a sensor node as follows:

- The request of registration of an aggregator node (O2).
- Activation process of an aggregator node (O3).
- Running the connection manager of a historic sensor node (O4).

O3 operation will include in turn, the process of connecting an aggregator node. In the case of absence of an active aggregator node, we have the following two operations:

- The registration request to one history manager (O4)
- The request for activation of a new manager if any, which in turn asked to be assigned to a database for continuous recording of its values.

For each connection of a sensor node, a deadline over its connection time is defined after the first attempt if the connection is not established:

t_c^{max} , we consider t the time remaining before the end of the connection c of the sensor reaches its end *max*. Time t depends on the energy state of the node. As t_c^{max} is calculated locally in the sensor node, that does not require global synchronization with other nodes.

If several sensors send their operating requests in an area, priority will be allocated to the *sId* node with the minimum deadline and making the maximum number of attempts *S*. Hence (1):

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$$access_{sId}^{S} = \frac{1}{t_c^{max}} \quad (1)$$

Is defined:

- N_a^z : Number of actif agregator nodes *a* affected to zone *z*.
- E_s^z : The set of sensor nodes *s* waiting activation in zone *z*.
- d_s : Waiting time generated by a sensor *s*.
- d_a : Waiting time generated by an aggregator *a*.
- d_h : Waiting time generated by a historic management node *h*

Hence the waiting time *DA* given by equation (2), such as the delay generated only by sensor node depend on maturity t_c^{max}, *k* a number with possible values 0,1 et 2.

$$DA = t_c^{max} . d_s + k . d_a + k . d_h \quad (2)$$

Such as:

$$k = \begin{cases} 0, connection\ after\ the\ first\ attempt \\ 1, execution\ of\ the\ operation\ O3 \\ 2, execution\ of\ the\ operation\ O4 \end{cases}$$

The following algorithm provides details on functioning management of the queue of activation of an *N* number of sensor nodes in a specific area z_i.

Algorithm.1: Management queue of activation of a sensor.

//Update//
$E_s^z := E_{s'}^{z'}$
If $E_s^z < E_{s'}^{z'}$ *then*
//Declare Upgrade
End If

For i=0 ; i < $E_{s'}^{z'}$ *; i++ do*
$E[i] := t_{ci}^{max}$

$$access_{sId}^{S}[i] = \frac{1}{E[i]}$$

// calculate DA for m with the smallest value.

List $access_{sId}^{S}[i]$ */m*
If step1 then
$DA[i] = t_c^{max} . d_s$
If step2 then
$DA[i] = t_c^{max} . d_s + k . d_a$
Else
$DA[i] = t_c^{max} . d_s + k . d_a + k . d_h$
End List

For max (DA[i]) do
sId.affect();
i--;
End

B. Model faults corresponding to the network VMLI

1) Model of network

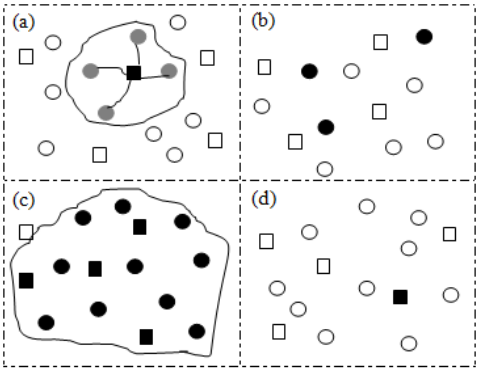

Figure 1.Different forms of faults that occur in the network

A flaw is caused individually or collectively, as Figure 1 shows that a fault occurs at either:

- A single unit (points in black) single unit (Figure 1 (b))
- An area in its entirety (Figure 1(c)).
- Or a coordinator node to which a set of simple nodes is attached, in a branch of an area (Figure 1 (a)) as gray circles becomes inaccessible.

Work [11] considers a probability of existence of the failed node in the hierarchical topologies, such that $0 < p < 1$, and $n \times p(n)$ nodes coordinators in the case of our platform. If the number of failed nodes is (n) , we denote the number of nodes coordinators $f_1(n)$, and the number of failed simple nodes is $f_2(n)$.

Where:

- $f(n) = f_1(n) + f_2(n)$ (5.5)

Then the failure rate of single nodes compared to all failing nodes in the network is:

- $T_2(n) = \frac{f_2(n)}{f(n)}$ (5.6)

2) Failure of sensor node:

In the proposed protocol [9], we consider an energy level which decreases after each operation sends performed by a node. A minimum level energy £. If a aggregator detects that the energy of a sensor is less than £ after updates in the maintenance phase, then it declares it as being unable to route information but its role is just inspecting the surveillance zone until the global broadcasting of this information in internal tables of the internal zone as well as tables of neighboring zones.

The deactivation process of the low node is presented by (Figure 2). The sensor node (orange) is a node that falls asleep, it must then inhibit the yellow node that is in a critical condition to be replaced by the fourth node (c). Phase (d) has three sensor nodes assigned to the node responsible in this case, the aggregator will go into yet available to host a new sensor.

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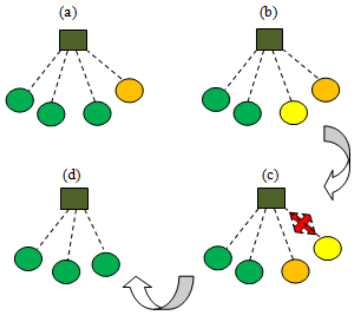

Figure 2 steps of replacement of a sensor node out of service

3) Location of flaws

The design of fault location used by [12], which considers that the nodes are of the same type and they are randomly deployed in one area, and there is no hierarchical relationship between sensor nodes, it is concluded that the proposed algorithm is applied on a flat structure. The latter considers three types of faults of a node, such as the systematic calibration error, the random noise error, and the complete malfunction of the sensor node. In the first two cases the sensors are still capable of receiving, transmitting and executing processes, even if they are defective.

In this part of node localization and faulty group of nodes, we use some notions of [13]. Firstly, our proposal considers that the nodes are faulty, if they are out of service. We begin by defining the set of variables and attributes to construct the algorithm for detecting faults.

We consider:

- $E_a^{z_i}$: The set of the active aggregators nodes a assigned to the zone z_i
- $E_s^{z_i}$: The set of the active sensor nodes s in the zone z_i.
- $V(E_a^{z_i})$: The set of neighbors of $E_a^{z_i}$ in zone z_i.
- $V(E_a^{z_{i-j}})$: The set of neighbors of $E_a^{z_i}$ in the neighboring zone z_j
- p : the probability of finding a failed node in a zone.
- $m_{a_i}^{z_i}$: The measures provided by $E_a^{z_i}$
- δ_1 : Threshold measurement comparison in the same zone.
- δ_2 : Threshold measurement comparison between two different zones.
- d_{ij}^t : The difference between the measurements of $E_{a_i}^{z_i}$ and $E_{a_j}^{z_i}$ in time t, $d_{ij}^t = m_{a_i}^{z_i} - m_{a_j}^{z_i}$
- $\Delta_{t_l} = t_{l+1} - t_l$
- $\Delta d_i^{\Delta tl}$: The difference between measurements of $E_{a_i}^{z_i}$ and $V(E_a^{z_i})$ from time t_l à t_{l+1} within the same zone.
- $\Delta d_{ij}^{\Delta tl}$: The difference between measurements of $E_{a_i}^{z_i}$ and $V(E_a^{z_{i-j}})$ from time t_l à t_{l+1} in two different zones.

$$\Delta d_{ij}^{\Delta tl} = d_{a(ij)}^{z_i(t_l+1)} - d_{a(ij)}^{z_i(t_l)} = \left(m_{a_i}^{z_i(t_{l+1})} - m_{a_j}^{z_i(t_{l+1})}\right) - \left(m_{a_i}^{z_i(t_l)} - m_{a_j}^{z_i(t_l)}\right)$$

Based on the module of outlier detection, we define a second module that includes all properties to develop the process of the algorithm for detecting and preventing faults at all monitored zones. The outliers value module can detect existing flaws at a branch managed by a coordinator node, in order to declare it in the network, then the simple nodes becomes inaccessible because the coordinator node fails(Algorithm 2), the case of (Figure2.a).

Algorithm 2 : Fault detection according to the proposed architecture :

//The first test that is established within each zone to generate the difference between the measurements of each coordinator node relative to its neighbors in the zone.

```
Use Module2;
For each E_a^{z_i} Do
        For each V(E_a^{z_i}) Do
        D_ij^t[k] = m_{a_i}^{z_i} − m_{a_j}^{z_i}
      Call (pdadd| Value, s);
        Value [s]:= Compare (d_ij^t[k] , δ1);
        Increase (i, j, k, s);
    EndFor
EndFor
For each s Do
        If count (value[s] > 1) = ω Then
        Call (pdTracer |"check the second verification");
        Increase(s);
EndFor
For each E_a^{z_i} Do
        For each V(E_a^{z_i}) Do
        Δd_ij^{Δtl}[k] := d_{a(ij)}^{z_i(t_l+1)} − d_{a(ij)}^{z_i(t_l)}
        If Δd_ij^{Δtl}[k] ≠ 0 then

Call (pdTracer |"There is some failure nodes in the network");
        Else
        Call (pdTracer |"No failure node");
        Increase (i, j, k);
   EndFor
EndFor
```


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//The second test is performed between multiple zones to detect the failure of a zone in its entirety. Zone i is defined as the central area.

Call（ListZones |zc, lst.ze);
ListZones.set [i,j] ;
Increase (i);
For each $E_a^{z_i}$ Do
For each $V(E_a^{z_{ij}})$ Do
$d_{ij}^t[k] = m_{a_i}^{z_i} - m_{a_j}^{z_j}$
Call (*pdadd*| *Value*, *s*);
Value [s]:= Compare ($d_{ij}^t[k]$, δ_2);
Increase (j, k, s);
EndFor
EndFor

// We use the second check if the first check in the Value table exceeds 3 zones with significant different measures of the central zone.

For each s Do
If count (value[s] > 1) = 3 Then
Call (*dndadd* | *Value*, s);
Value[s].dndadd(v);
Call (pdTracer |"check the second verification");
Call
Increase(s, v);
EndFor

// Implementation of the temporal test between all detected zones.

Call *(ValueInter* | $V(E_a^{z_{ij}})$ |s)

For each $E_a^{z_i}$ Do
For each ValueInter. $V(E_a^{z_i})$ Do
$\Delta d_{ij}^{\Delta_{tl}}[k] := \left(m_{a_i}^{z_i(t_{l+1})} - m_{a_j}^{z_i(t_{l+1})}\right) - \left(m_{a_i}^{z_i(t_l)} - m_{a_j}^{z_i(t_l)}\right)$;
If $\Delta d_{ij}^{\Delta_{tl}}[k] \neq 0$ *then*
Call (pdTracer |"There is some zones failure in the network");
Else
Call (pdTracer |"No Zone failure");
Increase (i, j, k);
EndFor
EndFor

In order not exhaust the simple nodes, our fault detection algorithm focuses on coordinators nodes (aggregators) that are more powerful, more each coordinator node keeps in memory the state of the set of simple nodes part of its tree collection. However it detects on each iteration if there is a simple node out of service, like we saw in subsection (*2 Failure of a node*.)

Where a simple node is considered adjacent to another node if and only if, the manager node is part of the area of recovery or transmission of the coordinator node, responsible of the other node.

At the same zone, we are interested in the data collected by each coordinator node. If the measurements collected by all of these nodes have values with a significant difference between the set of $E_a^{z_i}$ and $V(E_a^{z_i})$: which exceed the threshold δ_1 . In this case, we use $\Delta d_i^{\Delta_{tl}}$ to check if the current measures (*t*) are different from the old measures (*t-1*), this test can be repeated more than once. If measurements suddenly change if Δ_{t_l} changed , however, we can deduce that a node or more in the zone have failed.

With several zones, an overall comparison must be established between the set of zones represents the principal surface of monitoring, this in order to detect an area out of service in full (Figure2.c). The test is made up of eight surrounding areas with a central zone. The first comparison is measurements provided by coordinators nodes. $E_a^{z_i}$ That are part of the zone i with their neighbors in other zones $V(E_a^{z_{i-j}})$.

If the difference between the current measurement d_{ij}^t is greater than δ_2, then the second process is running $\Delta d_{ij}^{\Delta_{tl}}$ to compare the old measures with those existing in the different zones, the result is $= \Delta d_i^{\Delta_{tl}} - \Delta d_j^{\Delta_{tl}}$.

IV. PERFORMANCE AND EVALUATION:

We have simulated the behavior of our architecture under the J-Sim simulator. Open-source, J-Sim is built on the basis of the ACA (Autonomous Component Architecture), developed entirely in Java. The basic elements of J-Sim are components that communicate by sending and receiving data through ports. The specifications of each behavior of a component are determined by contracts. Each component can be developed and tested independently of all other components of the architecture. This makes J-Sim environment a truly platform-independent, extensible and reusable [15].

The simulation parameters for the experiments are as follows:

a. The dimensions of the monitored area: 1000 m /1000m
b. The number of sub areas varies between: 20, 24, 28, 32, 36, and 44.
c. Number of mobile nodes: 0
d. Channel : Wireless
e. The topography:
800: #X dimension of topography.
800: #Y dimension of topography.
f. The communication range of nodes is : 80 meter
g. Number of nodes : 402,602 et 700

1) Energy consumption

In this part, we evaluate the performance of our proposed algorithms and analyze their costs by measuring node energy expenditure. We compare a set of performance metrics of algorithm operations by simulation with the design of the procedures for fault detection of Zhls algorithms [14]

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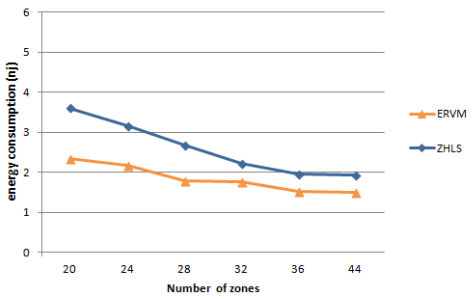

Figure 3 Average Energy Consumption for 402 nodes

It can be observed from figure 3 and 4 that our proposed algorithm consumes less energy for cluster head failure recovery when compared to zhls algorithms. In zhls algorithm, message exchange for the election of new cluster manager is both time and energy consuming. In our proposed algorithm, cell manager sends one message only to its member to recover from a failure.

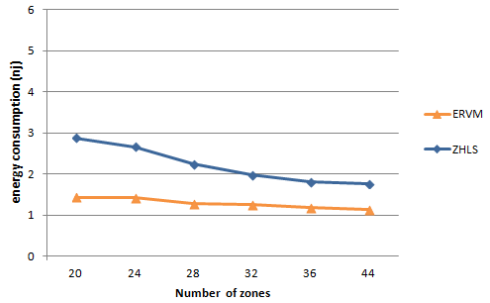

Figure 4 Average Energy Consumption for 602 nodes

2) Energy consumed per packet

The increased density increases the risk of the network interference (thus several retransmissions may be needed) and leads to an increase in the number of control packets exchanged in some types of networks. These factors justify the acute increase in energy consumed per packet in the case of using Zhls. Figure 5 and 6.

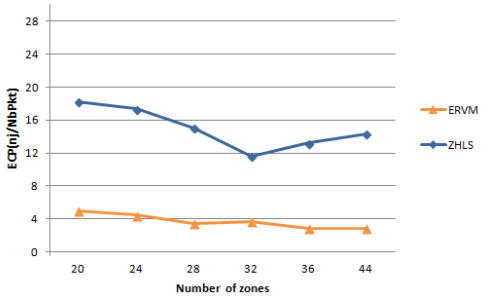

Figure 5 Energy consumed per packet in a network of 402 simple nodes

By increasing the packet sending rate, the energy consumed per packet in the ERVMs protocol was the best and energy consumed by packets drop by increasing the number of nodes in the network because it generates less routing overhead.

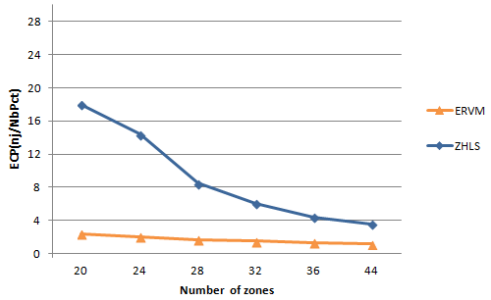

Figure 6 Energy consumed per packet in a network of 602 simple nodes

V. CONCLUSION

Due to potential deployment in uncontrolled and harsh environments because of their structure, wireless sensor networks are subject to a set of dysfunction. Through an exhaustive sweep of techniques of fault tolerance in particular in sensor networks, we found that the design of a procedure for fault tolerance depends on the architecture and functionality of the system. There are some techniques that have been discussed in this paper on fault-tolerant protocols that can be seen from different angles, namely temporal and architectural classifications. As well as techniques of detection and diagnosis, and summarize the first techniques to ensure effective mechanisms for resolving defects.

The objective of this contribution was the identification of the main types of defects, as well as techniques for the detection, diagnosis, and summarizes the first techniques to ensure effective mechanisms to limit the occurrence of defects. Error processing of the system in this paper necessarily depends on functionality of the infrastructure and management of the proposed sensor network [9][10]

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AUTORS PROFILE

Youness LYAZIDI Phd student at the electronic school mohammadia of engineer emi university agdal rabat . He's an engineer specializes in dtection of ERN, desa in technique of the radars , university military of munich

Ahmed KAMIL Currently a PhD student, University Hassan II /ENSEM Casablanca Morroco. Received his engineering degree from The *National School of Mineral Industry*, Rabat. Morroco.

Amina MERBAH Received the phd degree from University Hassan II /ENSEM Casablanca Morroco. Received a master's degree in 2010 at University of Sciences Semlalia–Cadi Ayyad, Marrakech, Morroco. Research: Reliability in Wirrelss Sensor Networks.

Hicham BELHADAOUI Currently working as a Assistant Professor in University Hassan II /ESTC, Casablanca Morroco.Received his Phd degree at National Polytechnic Institute of Lorraine/France.
Research : Reliability ,Automatic Signal Processing and Computer Engineering.

Mohamed OUZZIF Presently working as a Professor Ability in University Hassan II /ESTC. Received his Phd degree from University Hassan II /ENSEM, Casablanca Morroco.

Implementation of Two link Articulated Robot Kinematic Simulation using Echo state neural network

[1]M.R Prapulla and [2]C.Puttamadappa

[1]M.R Prapulla, Research Scholar,
Department of EEE, VInayaka Mission and University,
Salem , India.

[2]Dr.Puttamadappa C., Principal,
Sapthagiri College of Engineering, Bangalore, India

***ABSTRACT*-This paper presents the estimation of joint angles of two link robot using echo state neural network (ESNN).The ESNN is trained with x,y coordinates and joint angles. The data used for training the ESNN corresponding to the robot working space. Estimation accuracy of the ESNN is good for estimating the joint angles**.

Keyword: Echo state neural network; Forward Kinematics; Inverse Kinematics; Robotics; Degree of Freedom;joint transformations.

I. INTRODUCTION

Robotics is an interdisciplinary subject requiring Mechanical Engineering (addressed in module Components of a robot arm) Electrical/Electronic Engineering (addressed in module Control of a robot arm) Computer Science/Mathematics. Robotics is a special engineering science which deals with designing, modeling, controlling and robots' utilization. Robots accompany people in everyday life and take over their daily routine procedures. The rangeof robots utilization is very wide,from toys through officeand industrial robots and finally to very sophisticated ones neededfor space exploration.A large family of manufacturing equipment exist. These are used for arc-welding, spray painting, assembly, cutting, polishing, milling, and drilling. Industrial robot is very much used for these manufacturing applications.

Due to the arrangement of mechanical construction, the speed of movement of the robot body, the amount of load that may be carried by the robot, the robot has to be designed considering into kinematics and dynamics of the system to maintain stability of the robot in operation. The study of kinematics for any robotic manipulator can be broadly classified into two types, viz. forward kinematics and inverse kinematics. The forward kinematic problem is to find position and orientation of end-effector as a function of joint variables. The inverse kinematics problem is defined as the calculation of joint variables that would bring the end-effector to the specified position and orientation. As compared to forward kinematics, calculation of inverse kinematic solutions is a complex task since there is no possible unique solution due to non-linear and time-varying nature of its governing equation.The forward kinematics provide the means to map any configuration of the robot from its own multi-dimensional joint space to the three-dimensional physical space in which the robot operates, whereas the inverse kinematics provide the means to finding joint configurations that drive the end effectors of the robot to desired points in the three dimensional space. It is easy to see why kinematics are required in any kind of complex motion design.

A robot kinematic chain is an articulated manipulator that interacts with the environment and is typically described as an assembly of robotic links connected by (rotary) joints. The joints rotate and control the relative angular positioning of the links of the manipulator. Not all combinations of joints' positions in the chain are valid, because some combinations lead to collisions between the links of the chain or with some fixed item of the environment, such as the floor or a wall. All the valid combinations of joint values form the joint space.

A. Forward Kinematics

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The joint space reveals very little information about the position and orientation of the end effector of the kinematic chain. The forward kinematics define a mapping from the joint space to the three-dimensional Cartesian space. Given a kinematic chain with m joints and a set of joint values, the forward kinematics can find the position and the orientation of the end effector of the kinematic chain in the three-dimensional x-y-z space. Forward kinematics is a domain-independent problem and can be solved for any simple or complex kinematic chain yielding a closed-form, analytical solution.

B. Inverse Kinematics

Robot manipulators typically need to reach target points or follow trajectories in the three-dimensional space. To make the end effector of the robot reach a point or follow a trajectory, one has to specify appropriate values for the joints of the kinematic chain. The inverse kinematics define ways to go from the three-dimensional space to the joint space. In particular, the inverse kinematics define a relation between points in the three-dimensional space (position and orientation and joint values/angles in the joint space of a kinematic chain with m joints. The problem of inverse kinematics is domain-dependent and every kinematic chain has a different solution. The solution to the inverse kinematics problem can lead to an analytical, closed-form equation or to a numerical, iterative approximation (e.g. with the Jacobian approximation method). As the number of degrees of freedom (DOF) increases, a point in the three-dimensional space may have more than one matching points in the joint space.

The DOF refers to the number of joints in a kinematic chain; clearly, more DOF imply more flexibility in the motion. Robot kinematics is the application of geometry to the study of kinematic chains with multiple degrees of freedom. Robot kinematics provide the transformation from the joint space, where the kinematic chains are defined, to the Cartesian space, where the robot manipulator moves, and vice versa. Robot kinematics are quite useful, because they can be used for planning and executing movements, as well as calculating actuator forces and torques. The number of degrees of freedomthat a robot possesses is the number of independent position variables which would have to be specified in order to locate all parts of themechanism. Usually a robot is an open kinematic chain. This implies, that each joint variable is usually defined with a single variable and the number of joints equals the number of degrees of freedom.

A configuration of an n-degree of freedom robot is an n-vector where each q is either a rotational joint angle or a prismatic joint translation. This is known as the forward kinematicsof the robot. This is the static geometrical problem of computing the position and orientation of the end-effector of the robot. Specifically, given a set of joint angles, the forward kinematic problem is to compute the position and orientation relative to the base frame.

II. RELATED WORK

Saad et al, 1994, study the trajectory tracking problem to control the nonlinear dynamic model of a robot using neural networks. These controllers are based on learning from input-output measurements and not on parametric-model-based dynamics. Multilayer recurrent networks are used to estimate the dynamics of the system and the inverse dynamic model. The training is achieved using the back propagation method. The minimization of the quadratic error is computed by a variable step gradient method. Another multilayer recurrent neural network is added to estimate the joint accelerations. The control process is applied to a two degree-of-freedom (DOF) SCARA robot using a DSP-based controller. Experimental results show the effectiveness of this approach.

Ogawa et al, 2005, claim that multilayer neural network solves inverse problems. The inverse kinematics is used to estimate the joint angles of the robot arm from the end effector's coordinate is an inverse problem. The regularization method is examined to solve the ill-posedness.

Bingul and Ertunc, 2005, implement back propagation algorithm to solve the inverse kinematics problem of a robotic manipulator not having an analytical inverse kinematics solution. Their approach has large errors in the joint angles as a disadvantage and inability of the approach in providing multiple solutions of the inverse kinematics problem. The focus of the research work is to develop a neural network for controlling a 2-degree-of-freedom (3-DOF) manipulator in two-dimensional (3-D) space with no visual input. The tasks were to teach the network to (1) start from any initial position and move towards a fixed target position, and (2) start from an arbitrary initial position and move to an arbitrary target position.

Driscoll, 2000, develop a variety of network configurations based on radial basis function neural network (RBFN) to explore the effect of various network configurations on the performance of the network. Yang et al., 2000, develop an architecture of RBFN with two hidden layers was developed for an inverse kinematics problem of a 3-link manipulator. Shital et al., 2010, implement a fusion method. The method use RBFN for prediction of incremental joint angles which in turn is transformed into absolute

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joint angles with the assistance of forward kinematics relations. Another RBFN-based method is given in Zhang et al., 2004. It develops a structure of six parallel RBFN, each of which consists of six inputs which represent a location of the end-effector and one output as the joint angle. Thus, the group of six parallel RBFN (one for each joint angle) could perform an inverse kinematics approximation.

III. DATA GENERATION FOR TRAINING ESNN

The robot is defined with number of links used for construction. The length of the links are defined. In this work, two links are used. Hence the length of link 1 as L1 and length of link 2 is defined as L2.

The allowable swiping through angle for each link is as well defined. Let THETA1 is the angle between horizontal and the swiveling link 1. In this case, the THETA1 is defined as 0 < THETA1<π/2. Similarly, let THETA2 be the angle between the link1 and link2. ThenTHETA2 is defined as 0<THETA2<π.

The coordinates in the workspace are calculated as follows:

X = L1 * cos(THETA1) + L2 * cos(THETA1 + THETA2);

Y = L1 * sin(THETA1) + L2 * sin(THETA1 + THETA2);

IV. ECHO STATE NEURAL NETWORK

ESNN (Figure 1) has a recurrent topology of nonlinear PEs. These contain reservoir of rich dynamics. They contain information about the history of output and input patterns. The outputs of PEs (echo states) are fed to network output. Only the memoryless readout is trained. The recurrent topology has fixed connection weights.

Echo states represent a reservoir of highly interconnected dynamical components. Output is produced by training memoryless linear readout. In Figure 1 the following parameters are defined:

The input units are designated as M, theinternal PEs are designated as N, and the output units are designated as L. At time 'n', the value of the input unit is $u(n) = [u_1(n), u_2(n), ..., u_M(n)]^T$. The internal units are $x(n) = [x_1(n), x_2(n), ..., x_N(n)]^T$, and the output units are $y(n) = [y_1(n), y_2(n), ..., y_L(n)]^T$.

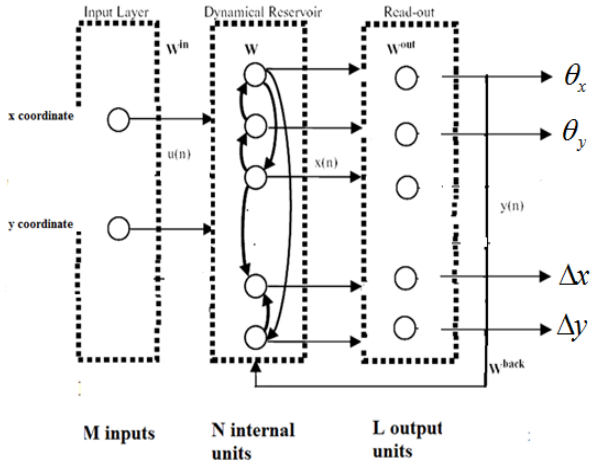

Fig.1 Echo state Neural network for learning Cartesian coordinates and joint angles

The ESNN connection weights are described as: a) (NxM) weight matrix $W^{back} = W_{ij}^{back}$ for connections between the input and the internal PEs, b) (NxN) matrix $W^{in} = W_{ij}^{in}$ for connections between the internal PEs, c) (LxN) matrix $W^{out} = W_{ij}^{out}$ for connections from PEs to the output units and d) (NxL) matrix $W^{back} = W_{ij}^{back}$ for the node connections that project back from the output to the internal PEs.

The PEs (echo state) is updated as follows:

$$x(n+1) = f(W^{in}\, u(n+1) + W\, x(n) + W^{back} y(n))$$

where, $f = (f_1, f_2, ..., f_N)$ are the internal PEs' activation functions.

All f_i's are hyperbolic tangent functions $\frac{e^x - e^{-x}}{e^x + e^{-x}}$.

The readout network output is $y(n+1) = f^{out}(W^{out} x(n+1))$, where, $f^{out} = (f_1^{out}, f_2^{out}, ..., f_L^{out})$ are the output unit's nonlinear functions [Atiya and Parlos, 2000; Jaeger, 2004, 2007, 2009].

The algorithm for training the ESNN is as follows:

Step 1: A pattern is presented to the network. The inputs are coordinates and the outputs are joint angles and difference in x, y.

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Step 2: The initial random weights are allotted to the network connections. The reservoir in the hidden layer is fixed through simulation. The state vector is initialized to zero.

Step 3: Obtain

$$\text{State\_vector} = \tanh(I_h * \text{Input\_coordinates} + H_o * [\text{Joint angles}, \text{differece in coordinates}] + \text{Reservoir} * \text{State\_vector})$$

Step 4: The pseudo inverse of state matrix corresponding to all the patterns are obtained as,

$$a = \text{pinv}(\text{State\_vector}) .$$

Step 5: The final weights $W_{out} = a * .T$ is obtained for estimating the joint angles.

The algorithm for estimating angles and difference of x, y using ESNN is as follows**:**

Step 1: The required coordinates are presented in the input layer of the ESNN.

Step 2:

$$S = \tanh(I_h * \text{Input\_coordinates} + H_o * [\text{Joint angles}, \text{differece in coordinates}] + \text{Reservoir} * \text{State\_vector})$$

Step 3: Joint angles are obtained as

$$\text{joint angles, difference x, difference y} = S * W_{out} .$$

V. RESULTS AND DISCUSSIONS

Workspace coverage by robot links: Figure 2 presents the workspace coverage by a two link robot. Link 1 is connected to the base, link 2 is connected to link 1.

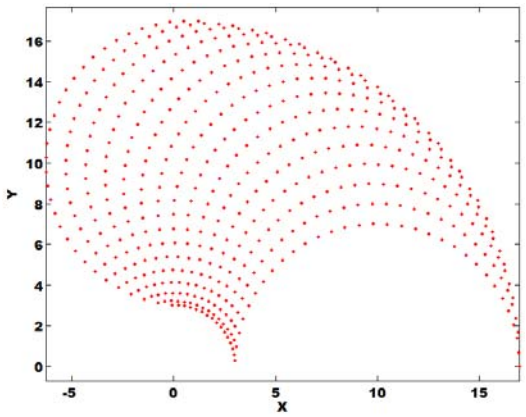

Fig.2 Workspace for two link robot

Joint angle estimation for two links by ESNN

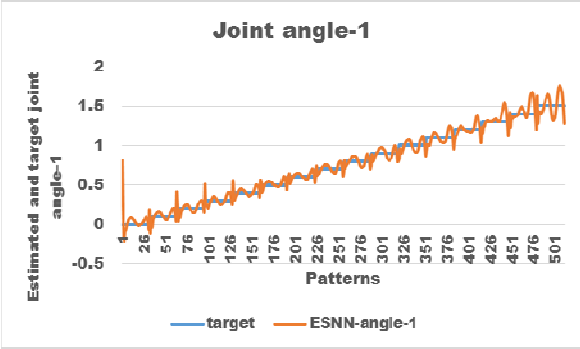

Fig.3 Joint angle -1 predicted by ESNN

Figure 3 presents the target values and ESNN estimated values for joint angle -1. Similarly, Figure 4 presents the target values and ESNN estimated values for joint angle -2.

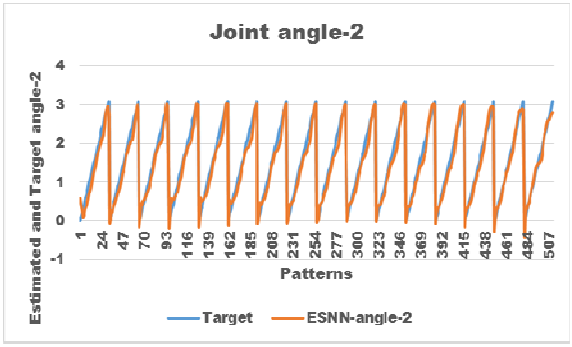

Fig.4 Joint angle -2 predicted by ESNN

Figure 5 presents the estimation of joint angle -2 by ESNN. The estimated angle -2 is closer to the target value.

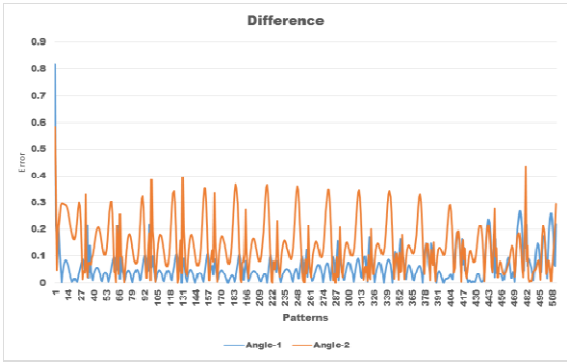

Fig.5 Estimation error

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Figure 5 presents the error in estimation of joint angles by ESNN. These error can further by used for training the ESNN along with joint angles to improve the accuracy of the ESNN.

VI. CONCLUSION

This work presents the implementation of echo state neural network in estimating the joint angles of the robot linkage given the x,y coordinates to position the end effector. Patterns are generated containing the x,y and joint angles of the robot linkage moving in a given workspace. The accuracy of the estimation of the joint angles are close to 95%.

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New Hybrid Intrusion Detection System based on Data Mining Technique to Enhanced Performance

Vidula Shukla
M.Tech Scholar
CSE Dept,SIRT
Bhopal, India.

Sumit Vashishtha
Assistant Professor,
CSE Dept,SIRT
Bhopal, India.

Abstract- **Intrusion Detection Systems (IDSs) is an efficient defense technique against network attacks as well host attacks since they allow network/host administrator to detect any type policy violations. However, traditional IDS are vulnerable and they are not reliable to novel and original malicious attacks. Also, it is very inefficient to analyze from a big amount of data such as possibility logs. Moreover, there are high false positives and false negatives for the common OSs. There are many other techniques which can help to improve the quality and results of IDS in which data mining one of them where it has been popularly recognized/identify as an important way to mine useful information from big amount of data which is noisy, and random. Integration of various data mining techniques with IDS to improve efficiency is the motive of proposed research. Proposed research is combining three data mining technique to reduce over head and improve execution efficiency in intrusion detection system (IDS). The Proposed research that ensembles clustering (K-Mean), Apriori and a classifications (Decision Tree) approaches. Proposed IDS execute on the standard KDD'99 (knowledge Discovery and Data Mining) Data set; this data set is used for measuring the performance of intrusion detection systems. Proposed system can detect the intrusions and classify them into four categories: Probe, Denial of Service (DoS), U2R (User to Root), and R2L (Remote to Local). A presented experiment results is carried out to the performance of the proposed IDS using KDD 99' dataset. Its shows that the proposed IDS performed better in term of accuracy, and efficiency.**

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Keywords— ***Internet; Intrusion detection; Data mining; Clustering, Classification, Data preprocessing.***

I. Introduction

Information security technology is an essential component for protecting public and private computing infrastructures. With the widespread utilization of information technology applications, organizations are becoming more aware of the security threats to their resources. No matter how strict the security policies and mechanisms are, more organizations are becoming susceptible to a wide range of security breaches against their electronic resources. Network-intrusion detection is an essential defense mechanism against security threats, which have been increasing in rate lately. It is defined as a special form of cyber threat analysis to identify malicious actions that could affect the integrity, confidentiality, and availability of information resources. Data mining-based intrusion-detection mechanisms are extremely useful in discovering security breaches. An intrusion detection system (IDS) is a component of the computer and information security framework. Its main goal is to differentiate between normal activities of the system and behavior that can be classified as suspicious or intrusive [16]. IDS's are needed because of the large number of incidents reported increases every year and the attack techniques are always improving. IDS approaches can be divided into two main categories: misuse or anomaly detection [6]. The misuse detection approach assumes that an intrusion can be detected by matching the current activity with a set of intrusive patterns. Examples of misuse detection include expert systems, keystroke monitoring, and state transition analysis. Anomaly detection systems assume that an intrusion should deviate the system behavior from its normal pattern. This approach can be implemented using statistical methods, neural networks, predictive pattern generation and association rules among others techniques. The research using Naïve Bayes classification with clustering data mining techniques to extract patterns that represent normal behavior for intrusion detection. The research describes a variety of modifications that will have made to the data mining algorithms in order to improve accuracy and efficiency. Using sets of naïve byes classification rules that are mined from network audit data as models of "normal behavior." To detect anomalous behavior, it generate Naïve Bayes classification probability with clustering followed from new audit data and compute the similarity with sets mined from "normal" data. If the similarity values are below a threshold value it shows abnormality or normality [7].

Related Work: Intrusion detection systems have been developed to identify any unauthorized attempts or successful attacks on any type of monitored data or resources available in network or host system. Data mining play an important role in intrusion detection to find regularities and irregularities in large dataset. Data mining techniques which are widely used are clustering, association rule and classification [6]. Now for better accuracy and detection rate hybrid data mining techniques are used. A hybrid classifier that uses Naïve Bayes and Decision Table Majority approach for intrusion detection [5]. A multi-threaded k-mean clustering has been introduced to detect novel attacks with existing attacks at high speed [3]. The efficiency and accuracy of detected system can be enhanced by using binary classifiers and multi boosting technique [2]. Use of improved Apriori algorithm in intrusion detection provides improved performance of system [14]. Hybrid approaches with different data mining techniques k-mean with binary classifier, k-nearest neighbor and decision tree [17], k-mean with k-nearest neighbor and Naïve Bayes [1], k-mean and Naïve Bayes classification [7], k-mean and Apriori algorithm [12] had been applied for improved intrusion detection system. In our

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proposed technique a new hybrid intrusion detection system based on data mining techniques using clustering (k-mean algorithm), association rules (Apriori algorithm) and classification (decision tree algorithm) will be applied to achieve enhanced performance in term accuracy and efficiency.

II. Proposed Work

This Chapter is going to be present general idea on a new proposed technique for intrusion detection system which will enhance efficiency as compare existing intrusion detection system. The proposed technique is using data mining techniques. Data mining techniques have been successfully applied in many different fields including marketing, manufacturing, process control, fraud detection, and network management. Over the past five years, a growing number of research techniques have applied data mining to various problems in intrusion detection. In this we will apply to data mining for anomaly detection field of intrusion detection. Presently, it is unfeasible for several computer systems to affirm security to network intrusions with computers increasingly getting connected to public accessible networks (e.g., the Internet). In view of the fact that there is no ideal solution to avoid intrusions from event, it is very significant to detect them at the initial moment of happening and take necessary actions for reducing the likely damage. One approach to handle suspicious behaviors inside a network is an intrusion detection system (IDS). For intrusion detection, a wide variety of techniques have been applied specifically, data mining techniques, artificial intelligence technique and soft computing techniques. Most of the data mining techniques like association rule mining, clustering and classification have been applied on intrusion detection, where classification and pattern mining is an important technique.

Proposed Concept: Here proposed technique is shall present a general idea as shown in figure 1 for intrusion detection system which will enhance efficiency as compare existing intrusion detection system. The proposed technique is using data mining techniques. In this clustering and classification data mining technique has applied for anomaly detection field of intrusion detection. Anomaly learning approaches are able to detect attacks with high accuracy and to achieve high detection rates. However, the rate of false alarm using anomaly approach is equally high. In order to maintain the high accuracy and detection rate while at the same time to lower down the false alarm rate, the proposed technique is the combination of three learning techniques. For the first stage in the proposed technique, this grouped similar data instances based on their behaviors by utilizing a clustering as a pre-classification component. Next, using Apriori, this classified the resulting clusters into attack classes as a final classification task. This found that data that has been misclassified during the earlier stage may be correctly classified in the subsequent classification stage. At last Decision Tree classification is applied. The proposed IDS shall be divided into following different modules**:**

1. Database Creation (Suggested Technique)
   - Download and Rearranged KDD 99'
   - Data Formation and Re-Processing of KDD 99' (Training and Testing Data Set Preparation)
2. Data mining Techniques
   - Clustering Technique
     - k-mean
   - Apriori
   - Classification
     - Decision Tree
3. Proposed Technique Comparison with Existing Technique:
   - Existing Technique:
     - K-Mean Clustering
     - K-Mean Clustering with Naïve Bayse classification
     - K-Mean with Naïve Bayse classification and Decision Table Majority Rule Based Approach
   - Proposed Technique:
     - K-Mean Clustering
     - K-Mean Clustering with Apriori
     - K-Mean Clustering with Apriori and Decision Tree Classification
4. Performance Analysis of Proposed Technique:
   - Time Analysis
   - Memory Analysis
   - CPU Analysis

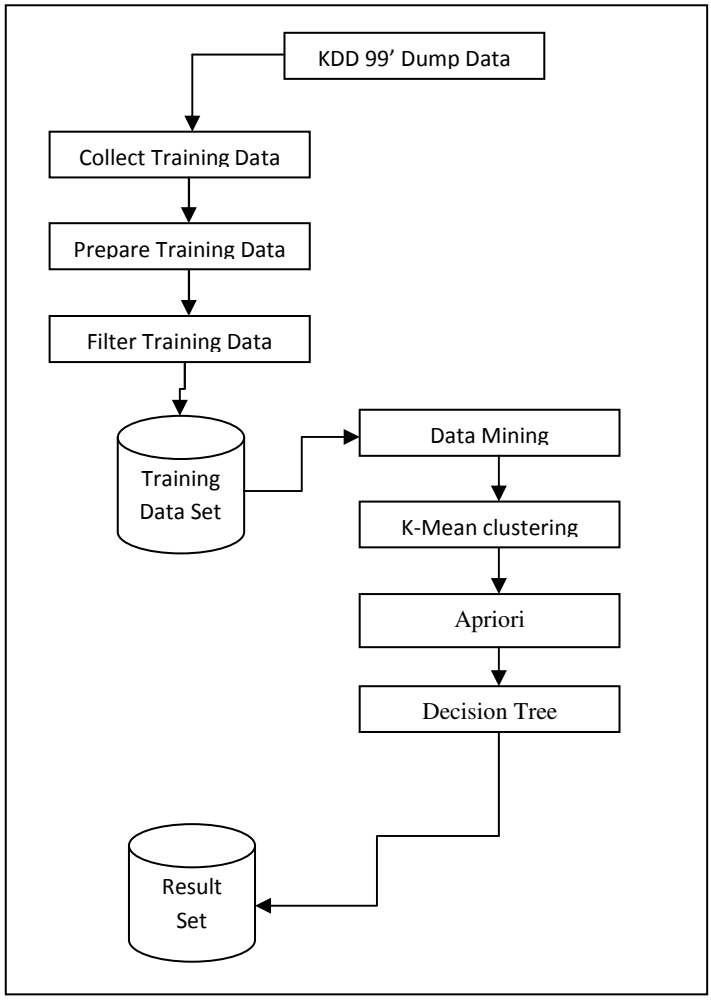

Figure 1: Illustration of Proposed Technique

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Proposed IDS Architecture: In the proposed technique, outline a data mining approaches for designing intrusion detection models. The basic idea behind this is to apply various data mining technique in single to audit data to compute intrusion detection models, as per the observation of the behavior in the data. In the proposed work we are combining three most useable data mining techniques into single concept and presenting architecture. In proposed technique, use Hierarchical clustering, APRIORI algorithm and CHAID approach. First apply the hierarchical algorithm to the given dataset to split the data records into normal cluster and anomalous clusters. It specifies the number of clusters as five to the hierarchical and clusters the records in the dataset into normal cluster and anomalous clusters. The anomalous clusters are U2R, R2L, PROBE, and DoS. The records are labeled with the cluster indices. Then, divide the data set into two parts. One part is used for training and the other one is used for evaluation. In training phase, apply the labeled records to the APRIORI for training purpose. The APRIORI classifier is trained with the labeled records. Then, apply the rest of unlabeled records to the APRIORI for classification. The APRIORI classifier will classify the unlabelled record into normal and anomalous clusters. Finally apply CHAID which is also the classifier that is doing exact match of each attribute values all to gather and thus removes the strong independence assumption.

Proposed Algorithm

Input: Dataset KDD, a sample K, Normal Cluster NC, Abnormal cluster AC, c is the number of clusters and d is the distance between them, ch1,ch2,ch3,ch4,ch5 are Nodes i1,i2,i3,i4 are the category

Output: K is abnormal or normal

Algorithm Hybrid

A) First apply clustering

1) Firstly load data into a root cluster and we start with one cluster and successively split clusters to produce others, more and more samples are clustered together.
2) For Every data point:
3) Find out the distance from the data point to every cluster.

Begin
Initialize c; c' = n; $D_i = \{x_i\}$; i = 1,...,n
Do
c' = c' - 1

4) Find nearest clusters D_i and D_j
5) Merge D_i and D_j

Until c = c'
Return c clusters
End

6) To find the nearest clusters in step 4, the following clustering criterion function is used:
$d_{min}(D_i, D_j) = \min \| x - x' \|$, where $x \in D_i$ and $x' \in D_j$
7) The merging of the two clusters in step 6 simply corresponds to adding an edge between the nearest pair of nodes in D_i and D_j. Also, if instead of terminating after a predetermined number of clusters have been obtained; it is possible to set the termination criteria to stop when the distance between nearest clusters exceeds a predetermined threshold.

B) Apply APRIORI Algo

1) For each Clusters C in KKD_i in test data do

If C is i1
Ch1=c
Else
If C is i2
Ch2=c
Else
If C is i3
Ch3=c
Else
If C is i4
Ch4=c
Else
Ch5=c
until end of data set

2) Collect data from dataset in the form of Normal/Abnormal and apply those data to the Apriori approach and build condition for the action like training/testing normal data set D.

C) Decision Tree

1) Preparing predictors. The first step is to create categorical predictors out of any continuous predictors by dividing the respective continuous distributions into a number of categories with an approximately equal number of observations. For categorical predictors, the categories (classes) are "naturally" defined.

If (c is not equal to ch1,ch2,ch3,ch4)
Then
c is Normal
Otherwise
c is abnormal

III. Results Analysis

For experiment use a laptop Pentium® Dual-Core CPU T4400 @2.20Ghz and 32-bit operating system, in which performance data is collected. In the experiments, the laptop executes fixed record data sets (182679). Several performance metrics are collected:

- Execution time
- CPU Utilization time
- Memory Utilization

The execution time is considered the time that an algorithm takes to produce results. Execution time is used to calculate the throughput of an algorithm. It indicates the speed of algorithm. The memory deals with the amount of memory space it takes for the whole process of Intrusion Detection System. The CPU Utilization is the time that a CPU is committed only to the particular process of calculations. It calculates the load of the CPU. The more CPU time is used in the execution process, the higher is the load of the CPU. During Results evolution we have use the KDD99 cup data set [21&22] for training and testing which is shown in table 1 and 2. In 1998 DARPA intrusion detection evaluation program was set up to acquire raw TCP/IP dump data [21 & 22] for a LAN by MIT Lincoln lab to compare the performance of various intrusion detection methods [5 & 6]. In KDD-99 data set each record is consists of a set of features, some of which are either discrete or continuous. The qualitative values

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are labels without an order which could be symbolic or numeric values e.g. the value of feature protocol type is one among the symbols {icmp, tcp, udp}. The numeric value of the feature logged in is 0 or 1 to represent whether the user has successfully logged in or not. For the quantitative attributes, the data are characterized by numeric values within a finite interval. Example can be the duration. Since the feature selection is applicable only to the discrete attributes, not to the continuous ones, the continuous features need be converted to discrete ones prior to the feature selection analysis. In order to evaluate the performance of this method we have to use KDD99 data set [22]. In these experimental results compare packet performance, time-consuming, memory utilization and CPU utilization of known algorithm on fixed size of record sets. During processing, the record sets are coming from data base, table 1 is producing training data set and table 2 is producing testing data set. For evaluation mode, there are two parameters: the number of evaluated record set and the size of evaluated record set, where the number of evaluated record sets is the number of record set that are generated randomly and the size of evaluated record sets can be chosen from database. In this mode, n cycles (that is, the number of the evaluated record sets) executed. In each cycle, record sets are respectively executed by proposed technique. Finally, the outputs of the proposed evaluation system are packet performance, execution time, and the execution time is measured in seconds. Actually, for an algorithm, the time-consuming of execution not only depends on the algorithm's complexity, but also the size of record sets. The expected results are illustrated as in Table 3 – 5.

Table 1: Number of Example used in Training Data Taken from KDD99 Data Set

Attacks Type	Training Example
Normal	170737
Remote to User	2331
Probe	7301
Denial of service	2065
User to Root	245
Total examples	182679

Table 2: Number of Example used in Testing Data Taken from KDD99 Data Set

Attacks Type	Testing Example
Normal	78932
Remote to User	1015
Probe	4154
Denial of service	885
User to Root	145
Total examples	85131

The execution time is considered the time that an algorithm takes to produce results. Execution time is used to calculate the throughput of an algorithm. It indicates the speed of algorithm. Table 3 is showing the execution time of proposed technique on 85131 testing data set.

Table 3: Comparison of Execution Time on 85131 Data Volume

Data Volume	Proposed IDS Technique(k-mean + APRIORI+ Decision Tree)
	Execution Time in Millisecond (Approx)
85131	499

The memory deals with the amount of memory space it takes for the whole process of Intrusion Detection System. Table 4 is showing the memory utilization of proposed technique on 85131 testing data set.

Table 4: Expected Memory Utilization

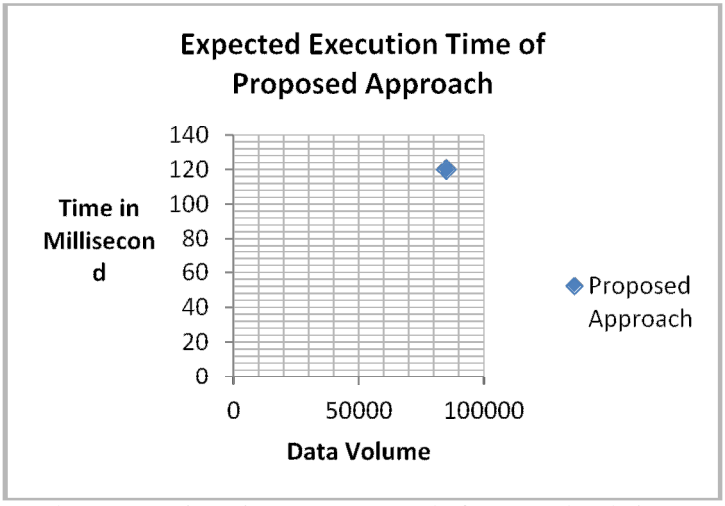
Name	Total Available Memory	Total Memory Consumption	Memory Utilization in % (Approx)
Proposed IDS Technique(K-Mean + APRIORI+ Decision Tree)	174568	12457	54

The CPU Utilization is the time that a CPU is committed only to the particular process of calculations. It reflects the load of the CPU. The more CPU time is used in the execution process, the higher is the load of the CPU. Table 5 is showing the CPU utilization of proposed technique on 85131 testing data set.

Table 5: Expected CPU Utilization

Name	CPU Utilization in % (Approx)
Proposed IDS Technique(K-Mean + APRIORI+ Decision Tree)	60%

Here graph-1 is drawing form Table-3 to reveal it. In this graph, execution time is showing where the evaluated mode is fixed size of record sets ranging from 85131 approx testing record sets.



Graph 1:- Execution Time vs. User Load of proposed technique on 85131 testing data set

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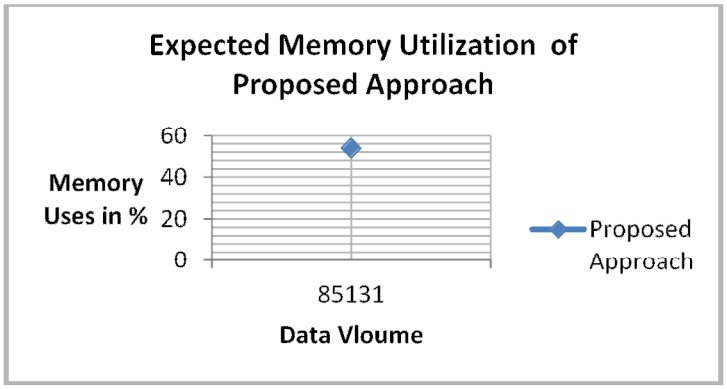
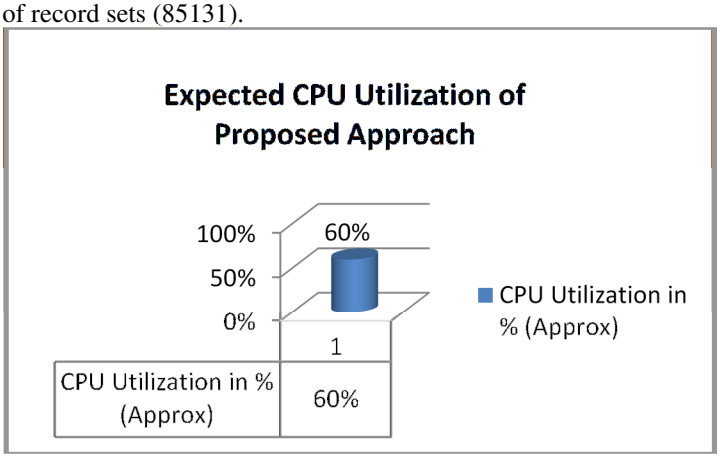
Here graph-2 is drawing forms Table-4 to reveal it. In this graph memory utilization is showing where the evaluated mode is fixed size of record sets (85131).



Graph 2:- Memory Utilization of proposed technique and on 85131 testing data set

Here graph-3 is drawing forms Table-5 to reveal it. In this graph CPU utilization is showing where the evaluated mode is fixed size of record sets (85131).



Graph 3: CPU Utilization of proposed technique and existing technique on 85131 testing data set

Experimental results for this compassion point are shown Table 3 to 5 at execution stage. The results show the superiority of proposed technique in terms of the processing time, memory utilization and CPU utilization. Finally, it is not difficult to find that, in contrast with these Tables, the larger the data record sets, the bigger execution time is. Besides, in contrast with these Tables, it is not difficult to find that the increasing data length can lead to the significant increment of execution time as well as memory utilization and CPU Utilization. Generally speaking, the time-consuming of known algorithm usually depends on the size of record sets of.

Strength of the Proposed System

- Proposed Hybrid technique is producing good performance then comparing technique to find normal packet performance.
- Proposed hybrid technique having low response time than comparing technique.
- Proposed hybrid technique using low memory space during execution than the compared technique and easy to understand and implement.
- Proposed hybrid technique used simple structure, control flow is well defined and looping structure is also minimized. Due to the following facts it take very less time for execution.

IV. Conclusion

As information systems have become more comprehensive and a higher value asset of organizations, intrusion detection systems has been incorporated as elements of operating systems, although not typically applications. Intrusion detection involves determining that some entity, an intruder, has attempted to gain, or worse, has gained unauthorized access to the system. This research shows that benchmarking intrusion detections systems can be done effectively. In this work design and develop more advanced data mining techniques, it will be very hard to evaluated proposed intrusion detection systems. The amount of customization of data mining techniques that goes into effectively using one, as well as the ever-changing number of viable network exploits makes it impossible at this time. The speed of operation during data mining technique is faster. During testing, proposed IDS run in few second to get output. In this no debugging is required. This is due to the high amount of string optimization involved through data mining technique.

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Macro Variable Predictive Model in Determining Susceptibility Regions using Combined Methods of Double Exponential Smoothing and Fuzzy MCDM (Case Study: Central Java Province)

Alessandro C. Baramuli
Faculty of Information Technology
Satya Wacana Christian University
Diponegoro Street, 52-60,
Salatiga, 50711, Indonesia

Sri Yulianto J. P.
Faculty of Information Technology
Satya Wacana Christian University
Diponegoro Street, 52-60,
Salatiga, 50711, Indonesia

Kristoko D. Hartomo
Faculty of Information Technology
Satya Wacana Christian University
Diponegoro Street, 52-60,
Salatiga, 50711, Indonesia

***Abstract*— The problem of regions that are vulnerable to be poor has been a particular concern in Central Java Province. One important aspect to support the reduction of regions that are vulnerable to be poor is the availability of accurate data. This study aims to provide an alternative solution by creating a predictive model of macro variable to determine areas which are vulnerable to be poor in the region of Central Java Province, which has poor population of as many as 4,704,870 people, with 14.44 percent of poor people in September 2013. The prediction model built is using combination methods of Double Exponential Smoothing (DES) and Fuzzy MCDM (FMCDM). DES method is used to predict the macro variable which is the rate percentage of the school of 7-12 years enrollment, the rate percentage of the school of 12-15 years enrollment, the percentage of the population working in the informal sector, the percentage of population working in the formal sector, and the percentage of contraceptive users. The validation results of the predictions are done by the approaches of MAPE, MSE and MAD. To determine the areas that are vulnerable to be poor, the macro variables data of the prediction results will be evaluated using the FMCDM method. The result of this study is a model that can provide visualization of predicted regions that are vulnerable to be poor in Central Java to the stakeholders as decision makers, by utilizing information technology that is based on geographic information systems, and is expected to assist in the planning of countermeasuring regions that are vulnerable to be poor.**

Keywords*— *Prediction, Double Exponential Smoothing, Validation, Fuzzy MCDM, Poverty, Vulnerability.

I. INTRODUCTION

In Indonesia, based on National Socio-Economic Survey (In Indonesia: Survey Sosial Ekonomi Nasional-SUSENAS) September 2013 showed that the highest percentage of poor people are on the island of Maluku and Papua, amounting to 24.24 percent, and the lowest percentage of poor people is in the island of Borneo, amounting to 6.66 percent. The island of Borneo has the smallest number of poor people which is 978,720 people, while the largest number of poor people in the island of Java is 15,546,940 people [1]. SUSENAS data on September 2013 is putting the island of Java as an island with the largest number of poor population when compared to other islands in Indonesia, and it can be one of the focus areas for the government to reduce poverty. Data on the number and percentage of poor people in 6 (six) Java Provinces shows that the Province of Central Java has the second largest number of poor people, i.e. 4.7 million people (16.48 percent of the total number of poor people in Indonesia) with 14.44 percent of the poor people [1], as shown in Table 1.

Table 1. Poverty in Java Island

No	Province	The Number of Poor (000)	Poverty Headcount Index (%)
1	Jakarta	375.70	3.72
2	West Java	4,382.65	9.61
3	Central Java	4,704.87	14.44
4	Jogjakarta	535.19	15.03
5	East Java	4,865.82	12.73
6	Banten	682.71	5.89
	Indonesia	**28,553.97**	**11.47**

Source: SUSENAS Data in September 2013

Data on the number of poor people in Central Java Province in 1996-1999 period is increased by 2.338 million people because of the economic crisis, from 6.418 million people in 1996 to 8.755 million in 1999. The percentage of poor people has increased from 21.61 percent to 28.46 percent at the same period. In the period of 2002-2005, the number of poor people tended to decrease from 7.308 million people in 2002 to 6.534 million in February 2005. Relatively, there was a decline in the percentage of poor people from 23.06 percent in 2002 to 20.49 percent in February 2005. In 2006, there was an increase in the number of poor people, from 6.534 million people (20.49 percent) on February 2005 to 7.101 million people (22.19 percent) on March 2006. The increase of poor people in Central Java Province from February 2005 to March 2006 was due to the increase in fuel prices on 1 September 2005, triggering a rise on the price of other goods. However, since 2007 until 2013 the number and percentage of poor people again experienced declining trend [2].

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The graph of the number and percentage of poverty in Central Java Province in 1996-2013 periods is shown in Figure 1.

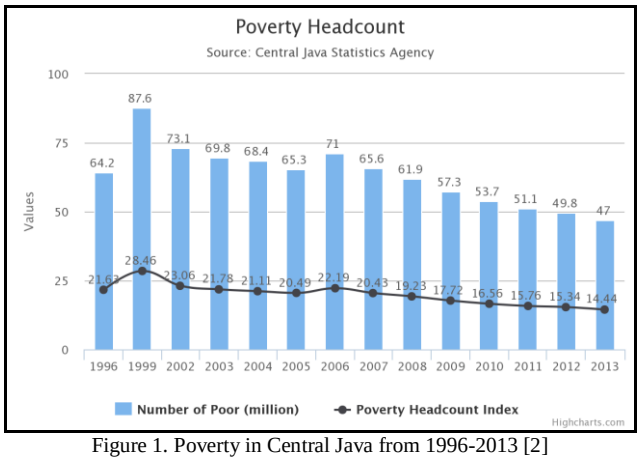

Figure 1. Poverty in Central Java from 1996-2013 [2]

Although the percentage of poverty in Central Java Province showed a declining trend, Central Java Province ranks as the second poorest province with the population of 4,704,870 poor people after East Java (4,865,820 people) in Java and Indonesia [1].

Poverty is a complex multidimensional problem, not only measured by income, but also about the vulnerability of a person or a group to be poor, for example vulnerable towards the needs of food, clothing, education, employment, health, shelter and other facilities [3][4][5][6]. To support the coping strategies of poor vulnerable areas, it is required to have monitoring of the community welfare that is integrated with the development planning, in the short term, for example to provide data and information on the spread of poverty in macro or to predict macro variables to determine the vulnerability of the areas that are going to be poor.

The method of Double Exponential Smoothing (DES) can be used to predict the vulnerability of the areas that are going to be poor because this method includes projections of future values of variables which are entirely based on observations of the past and the present (time series) of those variables [7]. In other words, to look at what happened at a certain time (historically) [8]. Predicting macro variable data that caused the poverty vulnerability of an area is not enough to help in resolving the problem of countermeasures the areas that are vulnerable to be poor. However, which areas are the most vulnerable to be poor should also be known to be the main focus of poverty vulnerability alleviation in the upcoming period for policy makers. The problem solving of determining which areas that will be vulnerable to be poor is using the Fuzzy MCDM (FMCDM) method, where the data of the predicted results will be evaluated using FMCDM method.

Analyzing the problems that have been stated before, this research will make a prediction model of macro variables, i.e. education, work status and health as factors causing poverty areas in 29 districts and 6 cities in Central Java Province using combined methods of Double Exponential Smoothing and Fuzzy MCDM. The prediction model of macro variables aims to provide poverty vulnerability information through targeted geographical area to stakeholders by determining if the percentage of each macro variables in an area is low, then the vulnerability levels are high. It is also expected that the prediction model of macro variables will give contribution in making targeted decision by using geographic information system as information visualization of the areas that are vulnerable to be poor.

II. Literature Review

A. Research Preview

Exponential Smoothing (ES) is one of the prediction models, where the model is equalizing the value of the last forecast with its observations [9]. On the ES models, Simple Exponential Smoothing (SES) is always slowed down when the data pattern form a tendency (trend). But to overcome the problems, Double Exponential Smoothing (DES) is used. ES model is a popular model for short-term prediction [10]. However, the determination of smoothing constant in ES can be variable depending on the decision maker. Smoothing constant value and the initial value of the first period have to be optimal to make a prediction [11].

Xie, Hong, and Wholin [9] predicted software failure using DES method, where this method has more accurate prediction capability compared to other methods, those are the method of Goel-Okumoto (GO) and the method of S-shaped NHPP. Testing in predicting software failures generated an error based on Sum of Absolute Error for DES method 13.3, GO method 64.2, and the method of S-shaped 29.7. They concluded that the DES method is the right approach in predicting and tracking a tendency (trend). The lack of precision of the estimation of smoothing parameters can make predictions become inaccurate [9][11].

The number of data periods required to make predictions is depended on the availability of data. Gardner and Saiz [11] made predictions using data on 261 series that are divided into 71 monthly. Gorr, Olligschlaegerb, and Thompsonc [12] only used data of as much as 8 years (period) and in [13] used the data of as much as 6 years (period).

Makridakis, Wheelwright, and Hyndman in [14], explaining that the validation of prediction is one proof of the prediction accuracy. The sample was divided into 2 (two), namely: 1) matching sample and 2) validation sample. Matching Sample is done to find the smoothing parameters by using error prediction criteria, namely the sum of square one-step ahead. Meanwhile, the validation sample is used to evaluate the predictive capacity by means of the Mean Absolute Percentage Error approach (MAPE). Billah, Maxwell, Snyder, and Koehler [14] showed that the prediction validation results with the smallest value of MAPE are always

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choosing Local Trend Model (LTM) or Holt's exponential smoothing for annual data and Additive Seasonal Model (ASM) or Winter exponential smoothing for monthly data [14].

Caiado [15] combining prediction methods with variations such as Holt-Winters, ARIMA, and GARCH to predict water use in Spain can improve prediction accuracy and reduce the error value. Such an approach is useful when there is no comparison of the best method in making predictions.

Prediction of several alternative destinations as done by [9], [11], [12], [13], [14], and [15] does not apply resolving issue for decision support to the predicted outcome. Analysis of the decision is needed because problem solving becomes more complex and decision making becomes more difficult [16].

Hartomo, Yulianto, Wowor, and Satriya [17] implemented a decision support by making spatial modeling to determine the poorest area from the Regency/City in Central Java Province based on Poverty Headcount Index (P0), Poverty Gap Index (P1), and Poverty Severity Index (P2). Their results lead to the conclusion that the 10 poorest Districts/Cities are: Wonosobo District, Brebes District, Rembang District, Purbalingga District, Kebumen District, Demak District, Wonogiri District, Banjarnegara District, Banyumas District, and Pemalang District. However, they did not predict the data of poverty region as one important aspect to support targeted poverty reduction strategies [18].

This study makes a model to predict and determine the vulnerable poor regions with the combined method of Double Exponential Smoothing (DES) and Fuzzy MCDM (FMCDM) based on several factors, namely the cause of education, work and health status using the data of year 2005-2012. The combined prediction and determination of vulnerable poor areas are the advantages of the prediction model of macro variables, because it is expected to help targeted decision making in implementing prevention policy of the areas that are vulnerable to be poor.

B. *Types and Patterns of Data*

The selection of methods to make predictions should consider the data pattern. Data patterns can be classified into four types, namely stationary, seasonal, cyclical, and trend [19]. **Stationary data** is the horizontal data pattern that is fluctuating around constant average value. **Seasonal data** is the data pattern influenced by seasonal factors (e.g. quarter of a given year, monthly, or day-to-day in a particular week). **Cyclical data** is data pattern occurred when there is data affected by long-term economic fluctuations such as those associated with the business cycle. **Data trend** is a pattern of data that having an increase or a long-term secular decline in the data.

C. *Double Exponential Smoothing*

Double Exponential Smoothing (DES) Method is used when the data shows a trend pattern [20]. Smoothing is done at each period - the level and the trend. Level is a smooth estimate of the data value at the end of each period. Trend is the smoothed estimation of average data growth at the end of each period [8]. Here is the equation for DES.

$$S_t = \alpha * Y_t + (1 - \alpha) * (S_{t-1} + b_{t-1}) \quad (1)$$

$$b_t = \beta * (S_t - S_{t-1}) + (1 - \beta) * b_{t-1} \quad (2)$$

$$F_{t+m} = S_t + mb_t \quad (3)$$

Where:

S_t : Predictions for t period
Y_t : The actual value of the time series
b_t : Trends in t period
α, β : Constant value ($0 < \alpha < 1$, $0 < \beta < 1$)
F_{t+m} : Results of m period prediction
m : The number of periods to be predicted

D. *Prediction Validation*

Validation of prediction results are used to determine the predictive accuracy by calculating the value of errors using Mean Absolute Deviation (MAD), Mean Square Error (MSE) and Mean Absolute Percentage Error (MAPE) [20].

MAD is used to measure the prediction accuracy by averaging the prediction error (absolute value of each error).

$$MAD = \frac{\sum_{t=1}^{n} \left(Y_t - \overline{Y_t}\right)}{n} \quad (4)$$

MSE is used to see the amount of the fault from the quadratic of the fault.

$$MSE = \frac{\sum_{t=1}^{n} \left(Y_t - \overline{Y_t}\right)^2}{n} \quad (5)$$

MAPE is used to find the absolute error of each period by dividing the value of the observations and then making it into percentage.

$$MAPE = \frac{\sum_{t=1}^{n} \frac{|Y_t - \overline{Y_t}|}{Y_t} x100}{n} \quad (6)$$

E. *Fuzzy MCDM*

Fuzzy Multicriteria Decision Making (FMCDM) is a decision support method which aims to establish alternatives based on certain criteria to be taken into consideration [21]. There are three (3) important steps that must be done to resolve the problem using the FMCDM, which are: 1) the

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representation of the problem, 2) evaluation of fuzzy sets, and 3) the selection of the optimal alternative.

F. Poverty as Vulnerability

Poverty as vulnerability is a condition that is affected by external factors and internal factors [6]. The vulnerability caused by external factor is the influence of development policy that has not been able to reach all levels of society and lead to unequal distribution of income, e.g. government policies in raising fuel prices, while the vulnerability caused by internal factor such as the inability to meet the minimum basic needs such as food, clothing, health conditions, housing, education and skills necessary to live and work [6].

The relevance of poverty with education is the higher the person's level of education, the higher the knowledge and skills that will also increase productivity of his work. The 9-year compulsory education is a program of the Government of Indonesia to answer the needs and challenges of the era. It is under the National Education Legislation in Indonesia No. 2/1989. The Government has tried to improve the living standards of the people by requiring Indonesians aged 7-12 years and 12-15 years to complete basic education programs in Primary School for 6 years and 3 years in Junior High School evenly [22]. In general, educational participation is measured by School Participation Figures (In Indonesia: Angka Partisipasi Sekolah-APS) [23].

Poverty is also associated with the job that may reflect a difference between poor and not-poor households where business sector becoming the main source of household income [22]. Factors that may affect poverty from the employment dimension is the people who work in the informal sector and the formal sector [24].

In the field of health such as Family Planning (In Indonesia: Keluarga Berencana-KB); KB program is undertaken to develop a prosperous family with the recommendation of having only two children. This program is beneficial to form a harmonious and healthy family. If a family is unable to meet the need for its family members, then this is the cause of poverty vulnerabilities in the family. Following the KB program can suppress birthrate and rapid population growth. Therefore, the population percentages of KB tools users (contraception) influence the susceptibility to poverty [25].

The policies of handling regions that are vulnerable to be poor [26] include 1) control of the population number; 2) development of database in determinating the target group; 3) the provision of basic needs (food, clothing, housing, health, and education); 4) creation of employment opportunities; and 5) regional development programs.

III. METHODOLOGY RESEARCH

A. Stages of Research

This research was conducted in three (3) stages that are organize as follows.

1) Identification of The Macro Variable Data

Identification stage of the macro variable data is done through data collection of education, working status and health, that are classified (digitizing) based on indicators and sorted per-its-period (annual). For education, using percentage data of school enrollment rates of 7-12 year and the percentage of school enrollment rates of 12-15 year, the percentage of jobs using the data of people working in the informal sector and the percentage of people working in the formal sector, and for health using the percentage of population that are contraceptive users.

2) The Making of Predictive Model

The stages in making the Predictive model are first by identifying data pattern, then selecting the method of prediction that is appropriate with the data pattern. Validation of the accuracy of predictive results is made by MAPE, MSE and MAD approaches. To find out areas that are vulnerable to be poor in the future, evaluation using Fuzzy MCDM is done from the predictive results of some variables, i.e. the percentage of the school enrollment of 7-12 year, the percentage of 12-15 year school enrollment, the percentage of the population working in the informal sector, the percentage of the population working in the formal sector and the percentage of contraceptive users.

3) Representation of Geographic Information

Representation of geographic information stage is done by using geographic information system-based technology for visualizing the data and information about the regions that are vulnerable to be poor in the form of tables, graphs and maps.

B. Design and Architecture Model

In general, the description of architecture model is divided into 3 parts:

1) Data Collection

The data of the percentage of school enrollment rates of 7-12 year, the percentage school enrollment rates of 12-15 year, the percentage of people working in the informal sector, the percentage of people working in the formal sector, and the percentage of population that are contraceptive users which have been digitalized into spreadsheet (.xls) and migrated into database (.sql), with the data period of 2005-2012.

2) Predictive Model Process

Prediction process is done with the data plot in advance to determine the pattern of the data, then using the appropriate method to predict the pattern of data for the prediction and validation of the results was conducted to determine the accuracy of the prediction. In this study, the search and

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implementation of the best prediction method is shown at the flow chart of Figure 2.

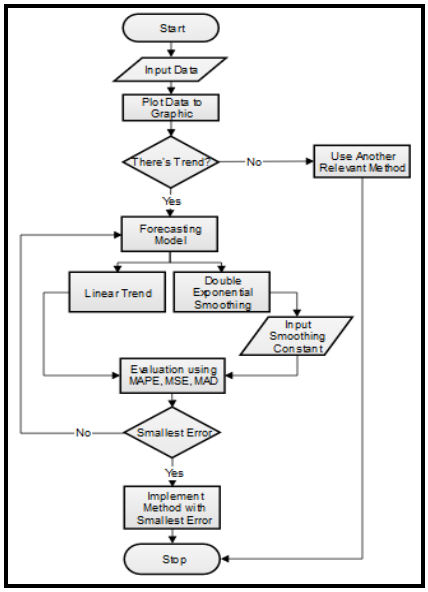

Figure 2. Selection and Implementation of The Prediction Method

The data of predicted results using the best predictive method will be evaluated to determine which areas will be vulnerably poor using Fuzzy MCDM methods.

3) Visualization of Geographic Information

The visualization of predictive model is made to represent the results of areas that will be vulnerably poor in the form of tables, graphs and maps using geographic information system-based technology.

The architectural design of predictive model built is shown in Figure 3.

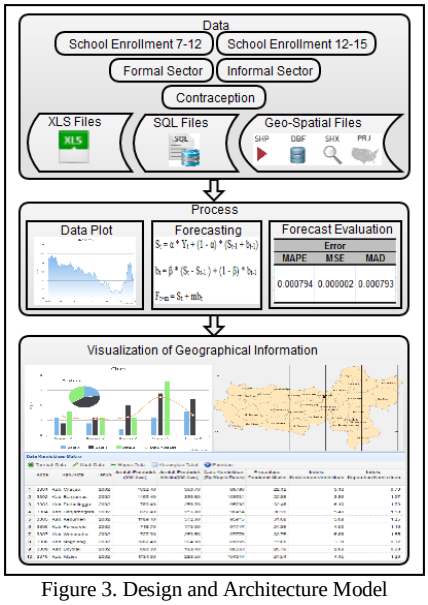

Figure 3. Design and Architecture Model

C. Prediction Algorithm

Predictive Algorithm using *double exponential smoothing* method is as follows:

Phase I: Initialization
Step 0
Initialize the actual data rows (Y) within a certain time frame.
Initialize the value of smoothing (alpha) and the value of trend (beta), with a range of values between 0 and 1.
Input number of periods to be predicted (calculated from the last actual data).

Phase II: Predictive pattern from the actual value
Step 1
Calculate the smoothing (S) and trend (b) of the second period.
$S_2 = Y_2$
$b_2 = ((Y_2-Y_1) + (Y_3-Y_2) + (Y_4-Y_3))/3$
Step 2
Repeat step 3 until the actual data length is met.
Step 3
Calculate $S_n = \alpha * Y_n + (1-\alpha) * (S_{n-1}+b_{n-1})$
Calculate $b_n = \beta * (S_n-S_{n-1}) + (1-\beta) * b_{n-1}$

Phase III: Predict as much as n period
Step 4
Calculate prediction $F_m = S_n + (m) * b_n$

Predictions for the next period after the actual data is done are just as much as 2 periods because if b_n is negative then the tendency will continue to go down, but if b_n is positive then it will be otherwise. The more the predictable period is, the further the predicted value will be from the actual final value.

D. Validating The Prediction Result

Suppose the simulation of the data test of predicted results (F) is using double exponential smoothing with actual data (Y), as shown in Table 2. Calculation errors is started at the second period to the last period of actual data (Y), because in the first period there is no predicted data, then the error value calculation cannot be done.

Table 2. Testing Simulation

Prediction (F)	-	50.42	48.08
Actual (Y)	18.06	50.71	47.99

The test process using MAD, MSE, and MAPE for period having predicted data (F) = {50.42, 48.08} and actual data (Y) = {50.71, 47.99}, is as follows:

$$MAD = \frac{(50.71 - 50.42) + (47.99 - 48.08)}{2} = \frac{0.2}{2} = 0.1$$

$$MSE = \frac{((50.71 - 50.42) + (47.99 - 48.08))^2}{2} = \frac{0.04}{2} = 0.02$$

$$MAPE = \frac{\left(\left|\frac{(50.71 - 50.42)}{50.71}\right| + \left|\frac{(47.99 - 48.08)}{47.99}\right|\right) x\ 100\ \%}{2} = \frac{0.39}{2} = 0.195\ \%$$

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E. Settlement with Fuzzy MCDM

There are 3 important steps that need to be done to complete the decision making problem using Fuzzy MCDM method [27], those are:

1) Problem Representation

a. Identification of the decision's purpose
b. Identification of the set of alternative decisions (A), if there is alternative n then A = $\{A_i \mid i=1,2,\ldots,n\}$
c. Identification of the set of criteria (C), if there is k criteria then C = $\{C_i \mid i=1,2,...,k\}$
d. Building a hierarchical structure problem

2) Evaluation of The Fuzzy Set

a. Choosing the set of linguistic variables that represent the weight (W) of interest for each criterion, which are T(interest) W={VL,L,F,H,VH} with VL=Very Low, L=Low, F=Fair, H=High, VH=Very High, then the degree of suitability of alternatives to the decision criteria T(fit) S = {VL,L,F,G,VG} with VL=Very Low, L=Less, F=Fair, G=Good, VG =Very Good.
b. Membership functions for each element is represented by using a triangular fuzzy, as follows:
VL = VL = (0; 0; 0.25)
L = L = (0; 0:25; 0.50)
F = F = (0.25; 0:50; 0.75)
H = G = (0.50; 0.75; 1.00)
VH = VG = (0.75; 1:00; 1.00)
c. Aggregating interests and decision criteria with fuzzy suitability index triangle.

3) Alternative Selection

a. Prioritizing alternative decisions using the total value of the integral.
b. Choose an alternative decision.

IV. Results and Discussion

To implement the prediction model of macro variables to determine which areas will be vulnerably poor in Central Java, it is necessary to search the best method. The process of searching the best method is done by plotting the data to the graph, then choosing the method according to the pattern of the data and the results of the predictions are validated to determine the error value. The best prediction method is the method that produces the smallest error value, then it is implemented on the existing case studies.

Sample data plot to the chart for the macro variables: the percentage of the school enrollment of 7-12 year, the percentage of 12-15 year school enrollment, the percentage of the population working in the informal sector, the percentage of the population working in the formal sector and the percentage of contraceptive users are shown in Figure 4.

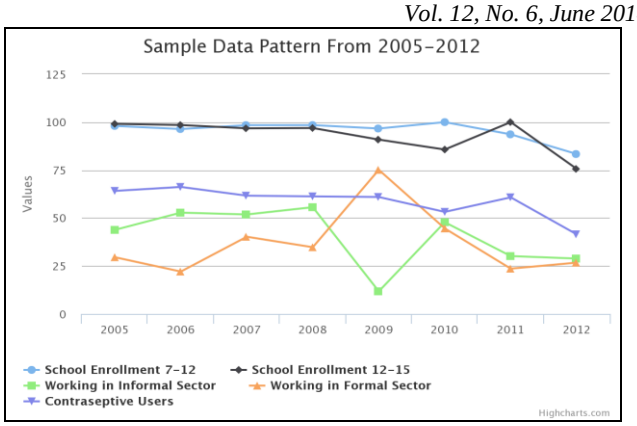

Figure 4. Sample Data Patterns from 2005-2012

The result of plotting the data in the form of graph, the data pattern is not seen too stationary and contains elements of the trend. Prediction method for trend data pattern is Linear Trend (LT), Double Exponential Smoothing (DES), Autoregressive (AR), and others [7][28]. Then, the search of the best prediction method in this study is by comparing the LT and DES. Furthermore, both methods will be validated using MAPE, MSE and MAD.

Prediction of validation sample using LT and DES on one region (Magelang District) in Central Java Province is shown in Table 3.

Table 3. Validating The Prediction Result

In.*	Linear Trend			Double Exponential Smoothing		
	MAPE	MSE	MAD	MAPE	MSE	MAD
C1	0.692	1.088	0.680	0.112	0.002	0.112
C2	8.158	70.66	5.493	0.161	0.018	0.106
C3	13.64	145.2	9.429	0.236	0.044	0.164
C4	41.45	95.90	6.767	0.526	0.025	0.103
C5	3.912	7.978	2.543	0.051	0.002	0.033

**C1= School Enrollments 7-12, C2= School Enrollments 12-15, C3= Informal Sector, C4= Formal Sector, C5= Contraceptive Users*

Based on Table 3, the DES method validation generating error value of less than 1 for MAPE, MSE and MAD, while the LT method produces generating an average error value which is more than 1. Through the validation of this prediction results, it can be proved that the DES method is better than the LT in data prediction using trend patterns. Therefore in this study, the DES method is implemented to do the prediction. The selection of the value of constants (α and β) in the DES method was sought by trial and error approach to obtain the optimal constant value. Selection of the optimal constant value in each case is varied depending on the data. From the test results prediction, if the value of α (alpha) is greater or close to 1 and the value of β (beta) is getting smaller or close to the 0 then the value of the resulting error will be even greater. But if the value of α (alpha) and β (beta) is done otherwise, it will result in a small error value. And in this study, the optimal value is obtained, i.e. for α = 0.01 and β = 0.9 for the prediction model using DES method.

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Pseudocode is using DES method with the sample of actual data (Y) and the number of data (n) as follows: The first step determines the smoothing (S) and trend (b) for the second period, that is $S_2 \leftarrow Y_2$ and $b_2 \leftarrow ((Y_2-Y_1) + (Y_3-Y_2) + (Y_4-Y_3))/3$. The second step is to determine the smoothing (S) and trend (b) for the third period until n period, that is: n = count (Y); for(i=3; i<n; i++){$S_i \leftarrow \alpha * Y_i + (1-\alpha) * (S_{i-1} + b_{i-1})$; $b_i \leftarrow \beta * (S_i-S_{i-1}) + (1-\beta) * b_{i-1}$;}. And the third step is to predict the future for some period after the last actual data, that is: $F_{i+m} \leftarrow S_i + m * (b_i)$.

Sample of prediction results using DES method with actual data from 2005-2012 period in one region (Magelang District) in Central Java Province is shown in Table 4. Prediction is done only for 2 (two) periods ahead, because if the value of the trend in the last actual data is negative, the predictive value will tend to decrease, while if the trend in the actual final data is positive then the prediction value will tend to rise. In addition, if you see the movement of data within the actual data series, it showed an up and down movement in almost every period of data.

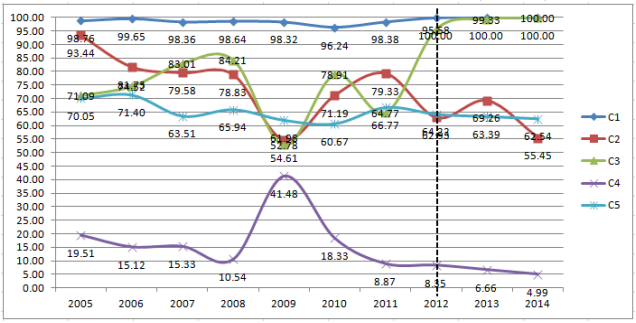
Table 4. Prediction with Double Exponential Smoothing

Period (Year)	Indicators*				
	C1	C2	C3	C4	C5
Actual Value					
2005	98.76	93.44	71.09	19.51	70.05
2006	99.65	81.73	74.52	15.12	71.40
2007	98.36	79.58	83.01	15.33	63.51
2008	98.64	78.83	84.21	10.54	65.94
2009	98.32	54.61	52.78	41.48	61.98
2010	96.24	71.19	78.91	18.31	60.67
2011	98.38	79.33	64.77	8.87	66.77
2012	100.00	62.93	95.58	8.35	64.22
Forecast Value					
2013	100.00	59.26	99.33	6.66	63.39
2014	100.00	55.45	100.00	4.99	62.54

C1= School Enrollments 7-12, C2= School Enrollments 12-15, C3= Informal Sector, C4= Formal Sector, C5= Contraceptive Users

By predicting the data of 5 (five) macro variables as the cause of vulnerability of poverty at the District/City in Central Java Province for future periods, it will be known if there is an increase or decrease in the percentage of school enrollment, percentage of the population working in the informal sector and the formal sector, as well as the percentage of contraceptives users. The vulnerability to poverty of a region in the coming period will occur when the percentage of 5 (five) macro variables showed a decrease.

Data visualization of predicted results with samples of Magelang Regency as susceptible areas of the first period prediction and of the second period is shown in Figure 5.



C1= School Enrollments 7-12, C2= School Enrollments 12-15, C3= Informal Sector, C4= Formal Sector, C5= Contraceptive Users

Figure 5. Visualization of Prediction Result

In solving the problem of determining the vulnerable poor regions after predicting macro variable data as the cause of some areas having poverty vulnerabilities, Fuzzy MCDM (FMCDM) method can be used, where the predicted outcome data in each period will be evaluated using this method with the first stage i.e. making representation of a problem for any alternative purpose (A) by a number of criteria (C). Alternative purposes i.e. $A=\{A_1,A_2,A_3,\ldots,A_{35}\}$ which are successively set as A_1= Cilacap District, A_2= Banyumas District, A_3= Purbalingga District,…, A_{35}= Tegal City and the decision criteria that is $C=\{C_1,C_2,C_3,C_4,C_5\}$ which are successively set as C_1=7-12 year school enrollment figures, C_2=12-15 year school enrollment figures, C_3= percentage of the population working in the informal sector, C_4= percentage of the population working in the formal sector, C_5= percentage of the contraception consumers. The second stage is to evaluate the fuzzy set of decision alternatives (the decision value and the degree of concordance). And finally a through review of all alternatives to find the integral (see section 3.5).

Predictive models are determined for 5 (five) areas that will be vulnerably poor in Central Java Province, and the results of the predictive model for vulnerably poor areas in the first period (2013) is the Magelang District, Purworejo District, Sragen District, Pemalang District, and Tegal District, as the Central Java visualization maps shown in Figure 6. Regions in Central Java visualization maps written by Indonesian, because geo-spatial file used Indonesian language (*Kabupaten* that is District and *Kota* that is City).

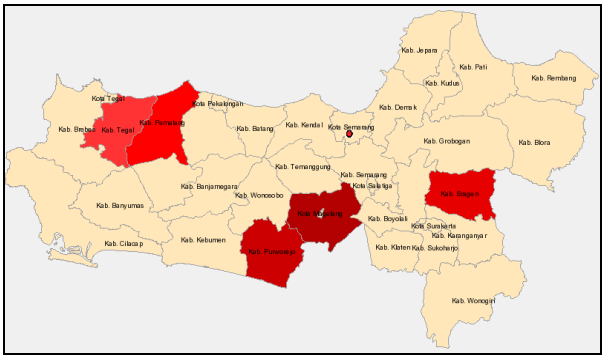


Figure 6. Visualization Map of The Result of Predictive Model in 2013

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The results of the predictive model for the second period (2014), five areas vulnerable to be poor are Magelang District, Purworejo District, Sragen District, Semarang District, and Pemalang District as shown in Figure 7.

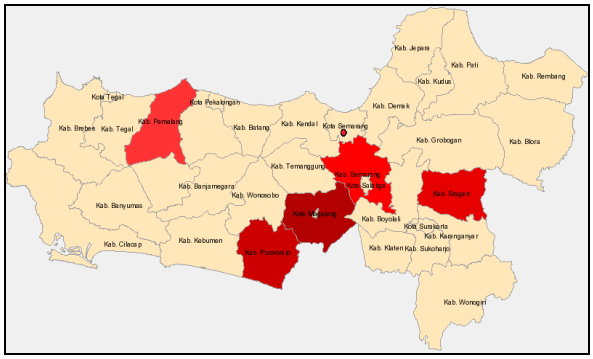

Figure 7. Visualization Map of The Result of Predictive Model in 2014

From the results of the predictive model of the first period (2013) and the second period (2014), the vulnerability of poverty due to school enrollment data aged 12-15 years (C2), the population working in the informal sector (C3), the percentage of the population employed in the formal sector (C4), and the percentage of contraceptive users (C5) showed a decrease. Although school enrollment of 7-12 years (C1) in Magelang District, Purworejo District, Sragen District, Pemalang District, and Semarang District showed an increase, but there is no significant effect on susceptibility in these areas. Vulnerability that occurs is affected by the decline in school enrollment rates at a higher level and a reduction in the working population in the informal and formal sector, because the level of education can encourage the level of labor productivity. This has resulted in the percentage of residents who have a fixed income per month decreased.

Validation of predictive models of macro variables to determine the vulnerability of regions using a combination of DES and FMCDM method is done by comparing with the results of the report of the Regional Poverty Reduction Coordination Team (In Indonesia: Tim Koordinasi Penanggulangan Kemiskinan Daerah-TKPKD) of Central Java Province in the Regional Poverty Reduction Strategy document (In Indonesia: Strategi Penanggulangan Kemiskinan Daerah-SPKD) Central Java 2011-2013. Results of TKPKD report mentions that the regions having a poverty rate above the provincial rate (red regions) are Cilacap District, Banyumas District, Purbalingga District, Banjarnegara District, Kebumen District, Purworejo District, Wonosobo District, Klaten District, Sragen District, Grobogan District, Blora District, Rembang District, Demak District, Pekalongan District, Pemalang District and Brebes District. As for the areas that have poverty rates above the national rate yet below the province's rate (yellow regions) are Magelang District, Boyolali District, Wonogiri District, Karanganyar District, Pati District, Temanggung District, Kendal District, Batang District, and The City of Surakarta. The areas in red are the distribution of a high percentage of poor people and the yellow areas are the distribution of a quite high percentage of poor people as shown in Figure 8. The percentage of poor people is the percentage of the population that had expenditure average per capita per month below the poverty line [29].

Figure 8. Dissemination of Poverty Headcount Index [29]

The TKPKD report mentions Semarang District and Tegal District are regions which having poverty rates below the national average (green areas). While the predictive model results in this study indicate that the District of Semarang and Tegal are vulnerable poor regions. This occurs because the macro variables data predicted that school participation rates of 12-15 years (C2), the population working in the informal sector (C3), the percentage of the population employed in the formal sector (C4), and the percentage of contraceptive users (C5) showed a decrease in both of the regions of ± 2.20 percent in each of the macro variables. In addition, there are anomalies in the data on the variable of percentage of the population working in the formal sector for Tegal, i.e. in the 5th period (2009) where the data in the 4th period (2008) is 37.29, 5th period (2009) is 3.66 and the 6th period (2010) is 37.89, as in this study used secondary data from the Central Statistics Agency (In Indonesia: Badan Pusat Statistik-BPS) in Central Java Province.

If the results of the predictive model showed a decrease in the percentage of macro variables, then the region will become increasingly vulnerable. The variables that most influence the vulnerability of the area is the percentage of the population who have access to a higher level education (12-15 years of school enrollment rates) and the population working in the formal sector. If someone has a high labor productivity, it will affect the level of income per capita per month.

V. Conclusion

Based on the results and discussion, it can be concluded that the predictive model of macro variables with Double Exponential Smoothing method has demonstrated good prediction accuracy with a relatively small error value: for MAPE is ± 0.213562 percent, MSE is ± 0.016613 and MAD is ± 0.083135, of course it is influenced by the selection of smoothing constants and trend constant. The results of the predictive model for the first period showed Magelang

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District, Purworejo District, Sragen District, Pemalang District, and Tegal District are five-prone areas. In the second period showed Magelang District, Purworejo District, Sragen District, Semarang District, and Pemalang District are regions that are vulnerable. Of those areas, the most influential indicator of vulnerability of poverty is the school enrollment rates of 12-15 years and residents who work in the formal sector because of the level of education and employment will affect income, while the two variables predicted results showed a decline to less than ± 10 percent.

Suggestions for development in further research are: 1) adding other macro variables related to vulnerability of poverty of an area so that the results of the predictive model can be more precise in giving information about vulnerable poor areas, such as the use of variable housing facilities (latrines, clean water, electricity, and floor area), income per capita, consumption of rice and other; 2) analysis of fiscal policy for regional development planning.

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The control model of security in the deployment of ERP systems

setare yaghubi
Department of computer,
Zanjan Branch, Islamic Azad University,
Zanjan, Iran

Nasser modiri
Department of computer,
Zanjan Branch, Islamic Azad University,
Zanjan, Iran

***Abstract*- Systems ERP software packages are vast and its implementation is facing with many complexity and challenges. The successful implementation of ERP in an organization depends on many factors. The successful implementation of ERP in an organization depends on many factors. This is very important in case of ERP systems due to the specific nature and affect all processes and activities of the organization. With the development of Web-based software to Smart invasions need to improve security during the implementation process there is. In this study reviews key success factors in ERP systems implementation methodologies and factors are discussed, and an approach to improve security during critical phases of implementation are proposed.**

Keywords: methodologies implementation of systems ERP, ERP Security Control, CSF, AIM, ASAP

I. Introduction

Enterprise Resource Planning (ERP) systems are becoming one of today's most widespread IT solutions. The primary functions of ERP are the integration of all the enterprises subsystems and business functions, i.e [1].

ERP systems are extensive software packages, That are created to support the development of integrated information in different parts of the organization such as manufacturing, financial, human resources. Cost of implementation this system is very high and it needs longer time for preparation

One of the most important in the implementation of great information is using, an approach and methodology in developing and implementing. The importance of this issue on ERP systems due to the specific nature and affect all processes and activities of the organization is very high.

Many studies and recommend of recommenders expressed the importance of improving software security analysis in the cycle software development rather than detection and removal it then generated, and given the widespread application of web-based software ERP, become more aggressive as well as a clever fraud, security software has become more important.

Section 2 of this paper examines important factors for successful implementation of ERP systems in turn, Section 3 discusses the methodology important in the deployment of ERP systems, In Section 4, we propose a method for managing security in the deployment process.

II. critical success factors of ERP systems

Implementing an ERP system is not an inexpensive or risk-free venture. In fact, 65% of executives believe that ERP systems have at least a moderate chance of hurting their businesses because of the potential for implementation problems . It is therefore worthwhile to examine the factors that, to a great extent, determine whether the implementation will be successful. Numerous authors have identified a variety of factors that can be considered to be critical to the success of an ERP implementation [2]. The most prominent of these are described below.

A. Top Management Support/Commitment

Top management support was consistently identified as the most important and crucial success factor in ERP system implementation projects.

Welti (1999) suggested that active top management is important to provide enough resources, fast decisions, and support the acceptance of the project throughout the company. Jarrar, et al. (2000) pointed out that the top management support and commitment does not end with initiation and facilitation, but must extend to the full implementation of an ERP system [3].

B. Clear understanding of strategic goals

ERP implementations require that key people throughout the organization create a clear, compelling vision of how the company should operate in order to satisfy customers, empower employees, and facilitate suppliers for the next three to five

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years. There must also be clear definitions of goals, expectations, and deliverables. Finally, the organization must carefully define why the ERP system is being implemented and what critical business needs the system will address [2].

C. Extensive education and training

Education and training refers to the process of providing management and mployees with the logic and overall concepts of ERP system.Thus, people can have a better understanding of how their jobs are related to other functional areas within the company. The user is the people who produce results and should be held ccountable for making the system perform to expectations [4].

Not surprisingly, when respondents were asked to indicate the degree of importance of each training factor the responding companies gave the highest importance. Yet, one of the major challenges that the study of has brought out was running out of the budget. Documenting the training process and measuring training performance were also given a low importance [5].

D. A great implementation team

According to Welti the availability, expertise, quality and composition of project teams were the most important HR requirements for success. Additionally, he suggested that the composition of project teams with skilful and competent project team members will directly influence the output of the project [5].

E. Excellent project management

Project Management coordinates the use of skills and knowledge. Furthermore it monitors the progress and the achievement of objectives of the according ERP project. The formal project implementation plan defines milestones like project activities, personnel planning on activities and organizes the ERP project process. The implementation of an ERP system is a complex project which involves a possibility of occurrence of unexpected events. Therefore the management of risk is needed to minimise the impact of unplanned incidents by identifying potential risks before negative consequences occur [6].

F. Project champion

Project sponsor commitment is critical to drive consensus and to oversee the entire life cycle of implementation. Someone should be placed in charge and the project leader should ``champion'' the project throughout the organization [7].

The project champion should be a high-level executive sponsor who has the power to set goals and legitimize change. Project champion work as an advocate for the system who is unswerving in promoting the benefits of the new system. İt rrefers to an individual, not always a senior manager, who consistently advocates the benefits of the ERP system. The success of technological innovation has often been related to the presence of a champion who performs the crucial functions of transformational leadership, facilitation, and marketing the project to the users. This champion usually owns the role of change champion for the project life and understands both the technology and business context [8].

G. Business plan and vision

Additionally, a clear business plan and vision to steer the direction of the project is needed throughout the ERP life cycle. A business plan that outlines proposed strategic and tangible benefits, resources, costs, risks and timeline is critical [7].

III. Methods of deployment ERP systems

One of the main points that exist in implementation of large information systems, utilizing an approach and methodology of development and implementation of system. The importance of this in ERP system is the nature of ERP systems and impacted all processes and activities of the organization.

Methodologies are one of the most important factors for successful implementation of ERP systems is considered. Methodologies are one of the most important factors for successful implementation of ERP systems is considered. Therefore, the selection of appropriate software and make the necessary arrangements to implement necessary methodology for the implementation of ERP in an organization to creating.

A. Methodology ASAP

In 1996, SAP introduced the Accelerated SAP (ASAP) implementation methodology with the goal of speeding up SAP implementation projects. ASAP was advocated to enable new customers to utilize the experience and expertise gleaned from thousands of implementations worldwide [9].

ASAP methodology has five phases that is a comprehensive and rich approach and, significantly reducing the overall cost and quality of the work is done at a high level [10]. In this method there are support from project management, member of team, external consultants and technical consultants, business process [10]. and a great tool for small and medium businesses [11]. Project management is a critical factor in the implementation of ERP systems, is provided by the ASAP. Good project management, especially in the process of designing, testing and end user training are important factors in successful implementation by SAP in the most organizations [4]. ASAP is a fast and flexible methods [10,11,12]. Figure 1 shows the phases in ASAP methodology.

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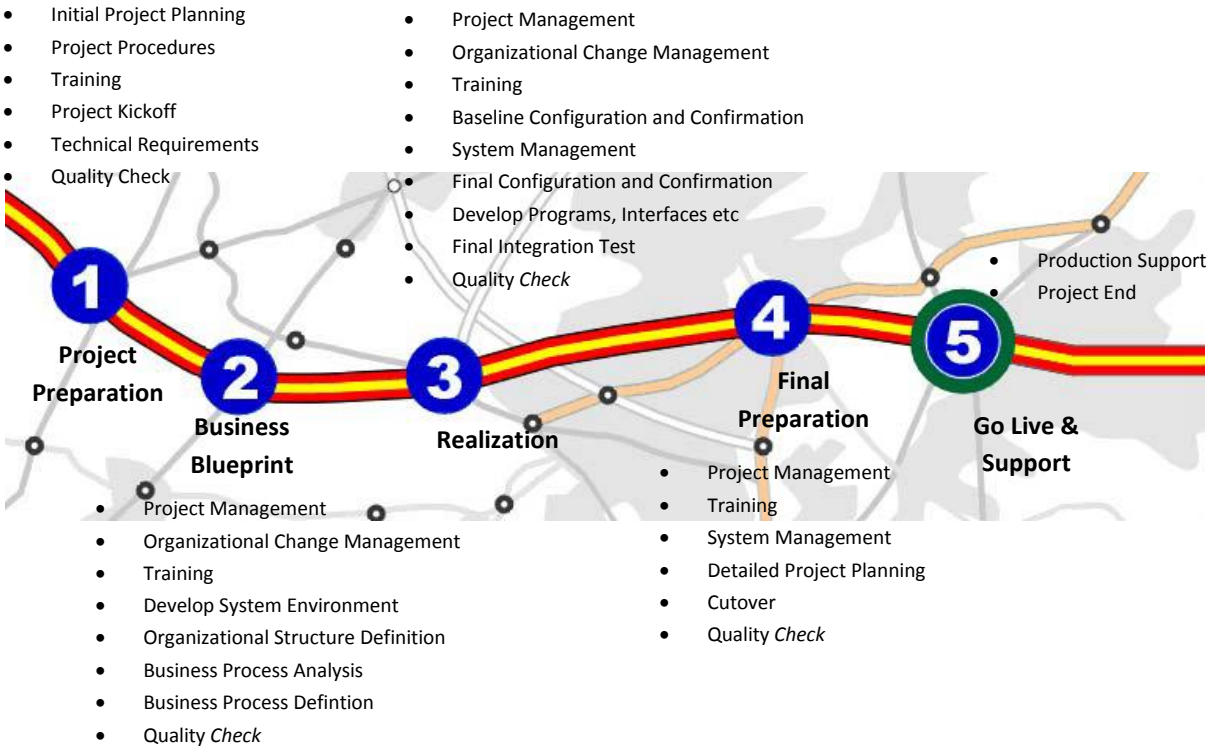

Figure 1: phases in ASAP methodology [13]

Phase I - Project Preparation

In this phase is done the preparation of elementary tasks of project [14]. Also in this step preparation of project charter, create Structure and organization of project review and refine the plan and implementing strategy implementation solutions, creating work teams and assign tasks, create plan and detailed action plan , defining technical requirements , initial meetings for bing project identification process model for doing , modeling and analysis of project requirements and determine organization of project , etc Is performed [13].

Phase II - Business BluePrint

Review, identify and design business processes in different fields is done via a standard procedure at this stage. In additional review and modeling of the business objectives and existing structures that are done [15]. In this phase after modeling current processes of organization, achieve to step modeling the future state of organization after changes [11].

Phase III – Realization

In this phase, tasks such Training project team, initial configuration of the system and receive confirmation, changes in basic ERP software has become an appropriate ERP solution to customize by means defined, creating and testing necessary interfaces, creating reporting Tools and testing them, testing integrity of the system is performed. Also in this phase program for transition is regulated [11,13].

Phase IV - Final Preparation

This phase allocated final preparation and review the plans projects. In this phase, system administration and user training, final testing of the system, applies the modifications and changes, transfer data from old systems to new systems is performed [11,13].

Phase V: Go Live & Support

Preparation and review launching System, correcting errors, preparing plans and schedules of timing and supporting its and activities of closing project in the final phase will be performed [11,13].

B. Methodology AIM

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AIM is Oracle's full lifecycle approach for implementing Oracle Applications. This methodology involves defining the activities, work processes, standards, procedures and practices, that detail of it described in six different sections with Milestone set guide and valuation activities relative to each other and define the main activities for the speedy implementation of projects and activities are complementary choice. In order to successfully implement this methodology, first action is required, and the resources needed to do and the resource needed for accomplish a specific project are recognized, and secondly, to do all of the activities, provides a patterns for the outputs . The main advantage of this methodology is that business requirements are defined early in the project and during implementation Consider placed. One of the major disadvantages of this methodology, its complexity [10]. Framework that are including elements such as steps, processes and tasks. AIM has a very wide scope, in this field investment of firms, sectors and there is a group of branches [16]. Figure 2 shows the phases in AIM methodology.

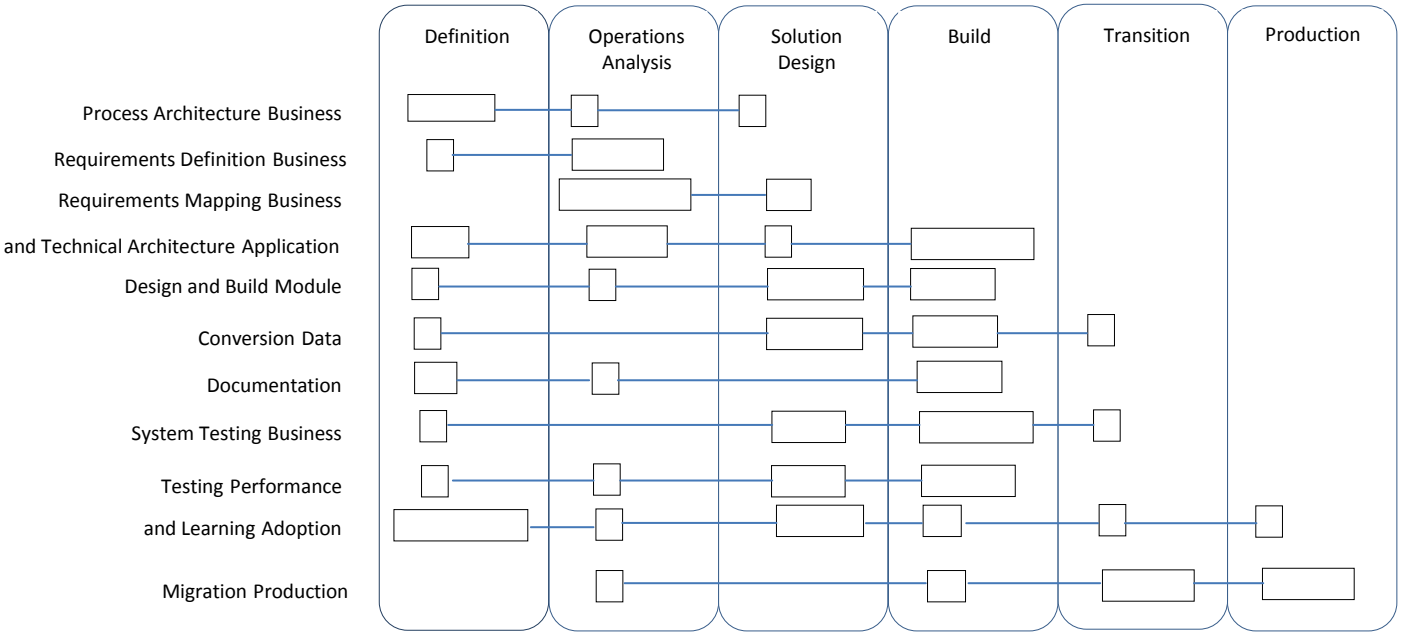

Figure 2: phases of the AIM methodology [16]

Phase I: Definition

In this phase, the employer and Contractor working together for planning process, review the resources and constraints, project scope and organization of operational teams [16,17].

Phase II: Operations Analysis

In this phase, the project team will move towards collecting work processes which can be extract differents current work step with standard applications ERP. Also, decide on the future organization of work processes are performed at this stage [16,17].

Phase III: Solution Design

The purpose of this phase detailed design new solution for the business needs and organization. Also based on organization's needs and if it is optional, it can be added selection other features can be added in solution. In this phase based on decisions of phase II provided solutions for conforming current work processes with standard process ERP [16,17].

Phase IV: Build

Coding and testing all areas of custom software, conforming software application in the organization, conversion data and design user interfaces is formed in this phase. effective testing and System testing is done in this phase. The purpose of this phase is to formulate and provide detailed requirements for computer applications and present a solution [16,17].

Phase V: Transition

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At this stage programs are made in previous phase the implemented operationally in organization and the data in the system before being transferred to the new systems and its weaknesses, is amended as. In this phase, the current business processes and ERP applications are working parallel. In other words application programs are tested in a real environment [16,17].

Phase VI: Production

The final delivery of the new system at last phase of this methodology and the beginning of system support cycle has been done. Improvement and steps of measurement to be carried out at this stage [16,17].

IV. Controlling security in ERP systems

Software has security problems, and software patches security and firewall solution to keep your security software updated. Today, produce massive of software. But at the same time, little progress has not been able to close the security gap. Simply specify that the method of production and development must be fundamental changes to improve the process.

Since ERP systems with resources and information on the organization and sometimes outside agencies interact ,as a result, information security, and set limits for access to this information is important. Since the different layers vary in different organizations and what types of information and data volume also varies. When implementing ERP systems, organizations must have a strategy in place to control access to systems and data should be considered.

There are security problems at any level of ERP systems, these aspects in three categories: network layer, presentation layer, the application layer can be divided, that include business processes, internal interfaces, and databases. Security aspects in ERP systems, including policies and security management, user authentication, separation of duties, access permissions, time limits, and entry is tracked and database security [18].

Many of studies and recommend of recommenders is expressed the importance of improving software security cycle (SDLC), rather than detecting and removing them from the production and wide distribution .According to the ASAP and AIM there are not any process control and security over deployment process ERP systems. In this paper, we propose the following 7 factors for security management. Figure 3 shows the Proposed factors for improving security.

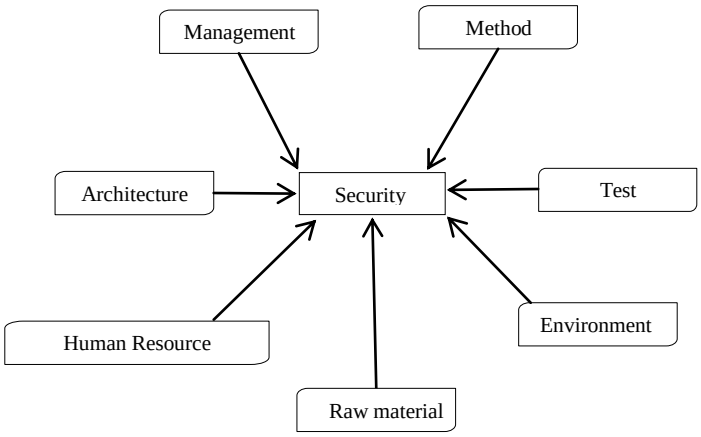

Figure 3: Proposed factors for improving security

Management- One of important factor in securing the ERP systems, is management factor. Manager must be able to identify security risks and disclosures and l have completed supervision over security tasks. He should have sufficient knowledge about ERP system security.

Method- Another factor establishing securing is methods that are used in the establishment of ERP system. There should be strategies in the establishing methods of ERP security for controlling access to the information system There should be access control file and log out. Proper security mechanisms must be used in security and threats are modeling.

Environment- One of the most important factors in the security context of software. Secure software context should be in the network, environment, software, databases and related hardware.

Raw materials- For the raw materials that need to be worked on. Knowing should be about the security issues, security risks and danger. Other word, should be cognition determine requirements of security, providing evidence and determine all matters relating to the security aspects.

Human resource- Human resource must have adequate experience in security and IT security team is involved from the early stages of design.

Tests of security- ERP system should be evaluated in terms of safety inspections. All aspects of system security fully described in a phase after implementation again examined and assessed.

Architecture- Architecture is one of the most important factors in architecture securing ERP system. If software architecture is designed to correct security gaps, ERP system will be resolved. Architecting is in database and environment software architecture.

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Given that the methodology of ERP systems to improve safety during any process is not considered In this paper, the AIM methodology for enhancing security during the deployment process, we offer the following approach:

Phase 1 – Definition

In the early stages of the methodology, the security team of experienced and familiar with security issues is determined precisely by the team's current performance and safety of the structure is known and weaknesses in the current system and determine the list of security threats and security requirements based on them fully determined requirements of security and also security control strategy is determined.

Phase 2- Operation analysis

Determined based on the requirements definition phase, requirements gathering and modeling threats to the future development of the model is done.

Phase. 3 - Design Solutions

In this phase, the design model of access control, security architecture, application design, database design, security and platform security, is implemented.

Phase 4 - Build

In this stage the security implementation in the programming environment, architecture, database and software context development is done, and also and security parameters of program and databases is implemented.

Phase 5 – Transition

Due to ERP systems should be evaluated in terms of security and inspection. All aspects of system security fully described in a later phase of the implementation will be reviewed and evaluated again. Thus the security evaluation phase before entering the real world enviornment. Security testing is done in a real environment. And security weaknesses can be removal.

Phase 6 – Production

In this phase errors and security flaws in the final product will be completed.

Figure 4 shows the Proposed model the production process security in ERP implementation stages.

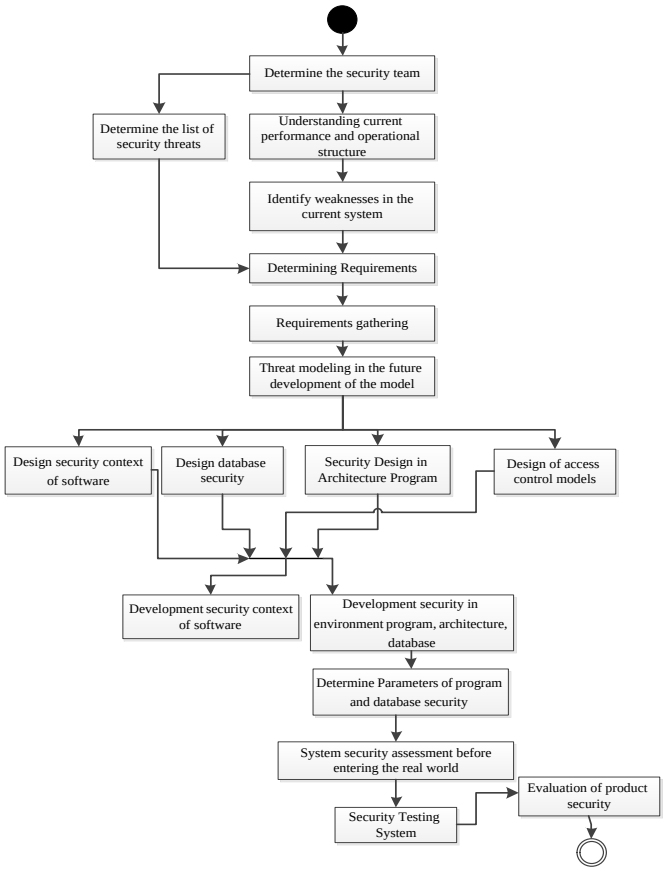

Figure 4 : the Proposed model the production process security in ERP implementation stages

V. Conclusion

ERP is a software solution beneficial to integrate enterprise resources. Also ERP implementation of integrated admissions processes for the rapid exchange of information between the various sectors and provides. One of the important factors for successful ERP implementation methodologies systems is. During the initial stages of the implementation of security controls can be detected and corrected errors and security flaws are. This system will reduce the cost of managing security. Due to security control is one of the characteristics of the main security control, quality control, thus security of controls in the during, implementation will enhance the quality of products.

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A Survey of Power Management Techniques of Computing Systems

Valma Prifti **Igli Tafa** **Suida Ajdini**

Faculty of Information Technology, Polytechnic University of Tirana

Faculty of Information Technology, Polytechnic University of Tirana

Abstract. All we know that in our days, battery lifetime is an important feature of personal computers, smart phones, tablets, i-pads etc. Consequently power consumption is becoming a big economical and ecological problem in IT industry. According to EPA, for every 1000 Kwh consumed electricity, is generated 0.73 tons CO2[1].

Consequently It produces huge environment pollution. In this paper we review some techniques to decrease as much as we can power consumption while having the minimum of impact in our CPU performance

As we can power consumption while having the minimum of impact in our CPU performance

Key words: CPU power consumption, power reducing, power management techniques, high performance computing, minimizing energy consumption, dynamic voltage scaling

I. INTRODUCTION

According to US ESPA: 10% of used electricity is consumed by desktop computers. Researchers have found out that 51% of the computers are left on during the night and in a year the power consumed is 29.8 billion Kw that costs to the economy $ 2.9 billion [1]. Minimizing energy consumption is the main target to the system designers. In the figure 1.1 is shown a distribution of the power consumption in a server system. So the main target of many researches is the CPU.

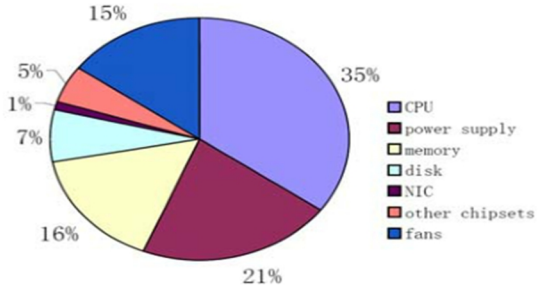

FIGURE 1. Power consumption distribution

Already exists too many ways to minimize power consumption of CPU [3]. They are different: process-level, application-level, custom-level and micro-architecture-level design [2]. Power management techniques are classified in two big groups: as dynamic and static [1]. Static Management Techniques are implemented during design time (off line) and are focused in software and hardware. Dynamic Management Techniques are implemented during running time (on line) when the system's workload is light or the system is idle. There are two types of dynamic management techniques.

- The first one is Dynamic Voltage Scaling (DVS), where the used voltage in different nodes is increased or decreased depending in the workload of the computer [12]. The voltage is decreased in case we want to save energy and the voltage is increased in case we want to upgrade computer's performance. Decreasing voltage is known as undervolting and increasing voltage is known as overvolting. Undervolting can also reduce temperature and cooling requirement.
- The second one is Dynamic Frequency Scaling (DFS), where frequency of the microprocessor

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is adjusting to the requirements of the system [13]. In the reality these methods are combined to handle every kind of operating systems in an optimal manner.

Well known Moore's says that the amount of the transistors on a chip doubles every 18 months consequently the power consumption of each computer nodes doubles at the same period of time [2]. Advanced Power Management (APM) is an API that makes an operating system running an IBM to collaborate with BIOS to reduce power consumption [11]. APM defines five systems power states [11]:

1. Full ON: The system is powered on and no part of it is on power saving.
2. APM Enabled: APM controls device power management and the system is powered on.
3. APM Standby: The CPU is slowed, the devices are in low power state and the computer state is saved until pressing a keyboard key.
4. APM Suspend: The devices are powered off but the computer state is saved. Returning to the former state can take relatively a long period of time.
5. Off: The computer is turned off.

II. Related Works

There are many earlier researches in this field of OS. One of them is made by Jacob L. Lorch and Alan Jay Smith. They are focused in reducing processor energy in MacOS. In their earlier researches they have found out that the most important target in further research was processor [4]. In their paper they have used and have compared, five different strategies of power reducing.

- The first one is the current strategy used for the power management, based on an inactivity timer. The processor will reduce the used power whenever has not occurred any activity in the last three seconds and any I/O activity has not occurred in last 16 seconds. After implementing this strategy, authors find out that we can save 28.87% more energy with an impact of 1.78% of CPU performance [4].
- The second one is the basic strategy, which means to turn off the processor whenever all the processes are blocked. The results of the technique were these: the energy savings were 31.98% with an impact of 0% [4].
- The third one is the simple scheduling technique. According to this technique, none of processes will be scheduled until it will be ready to run. The period of time during the process will wait until it will be scheduled is called sleep period. This strategy has a power savings of 47.10% and a performance impact of 1.08% [4].
- The forth one is the sleep extension technique. In this technique the sleeping periods are multiplied so they avoid some fractions running time of processes. The simulation showed that the performance impact was 1.84% and the energy savings was 51.72% [4].
- The last one is the greediness technique. When the SO finds out, that a process is not sleeping, even though it is not computing, the so blocks it for a fixed period of time. The results of this technique were: performance impact of 1.84% and energy savings of 66.18% [4].

Authors have made all those experiments in a MACOS. Their techniques can save processor energy from 47-66% with a loss of less than 2% [4].

An interesting article is published in EETIMES, an electronic newspaper is about dynamic power management techniques for multimedia processors. By combining dynamic and static power management methods described and by the authors in the article, they concluded the following results. When the system's workload is high, such as watching a high resolution video on a portable multimedia player, an overdrive OPP (operating performance points) will be set on VDD1 (which supplies the DSP and ARM processor) [14]. If we web browse, the power consumption is in a medium level, consequently the nominal OPPs will be set for VDD2 (that supports the interconnections between subsystems and peripherals) and VDD1[14]. These ways can save the battery energy typically around 70-80%. But in case we forget the music player on for a long time, the system places the device automatically in its off mode [14].

Another important survey in this field is made by Greogory F. Welch[7] but he is focused in mobile

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computing operating systems. For the part of the CPU consumption he implemented three algorithms, named OPT, FUTURE and PAST [7]. According to the author the first and the second one are impractical and undesirable. The third one is a latest version of the second algorithm. This algorithm is based in the past history of the CPU usage. He concludes that in a experiment with a 52 ms window can save more than 50% of the energy in a 3.2 volt CPU [7]. The result depends on CPU clock rate used and in the window lengths [7]. The impact in the performance is very little and not considerable.

An important survey about power management in server cluster systems is made by Wissam Chedid and Chansu Yu from the Department of Electrical and Computer Engineering Cleveland State University [9]. They have described five policies for minimizing the energy consumption in server clusters.

- The first one is Independent Voltage Scaling (IVS), which uses the voltage scaled processors. Each server manages its own energy consumption [9].
- The second policy, in a different way from the first one, coordinates all the nodes together to reduce power consumption of the cluster. It's called Coordinated Voltage Scaling (CVS) [9].
- The other policy, called vary-on_vary-off (VOVO), keeps on only the servers that are in use and turns off the other ones [9]. The forth and the fifth policies use combination of the other ones.
- The forth uses a combination of the IVS and VOVO, it's called Combined Policy [9].
- The fifth one combines CVS and VOVO and it's called Coordinated Policy [9].

From the simulations the authors noted that IVS can save power ranging to 20-29% [9]. CVS can save a little more energy than IVS, but CVS have a much more complex implementation. The saved energy from VOVO depends on the workload of the system. It's a great combination between VOVO and IVS, because can save more power than they can save on they own. Even VOVO-CVS combination can save to much energy, but this combination have a complex implementation. The last two power management policies can save approximately 34-55% of the servers energy [9]. The implementation of these power management policies, have an insignificant impact in the cluster performance.

Another research that is worth to be mentioned is made by Vijayalakshmi Saravanan in Mälardalen University, Sweden. He is focused in reducing power consumption of a multicores CPU based on microarchitecture techniques using pipelining method. According to him, minimizing the numbers of stages of pipelining with the code that he implemented to a multicore CPU, it's efficient to his primary target [2]. Pipelining method reduces the instructions per cycle clock, so it can significantly reduce power requirement without compromising with CPU performance [2]. With this method we can save about 24-36% of the battery energy.

Interesting research is made by Gerald Tesauro, Rajarshi Das, Hoi Chan. They have studied this problem in a mathematical way, combining a non linear function with an application of batch RL (reinforcement learning) [5]. Their technique, used in the experiment, can save more than 10% of the servers energy while keeping performance quite in the same level [5].

In their research Aqeel Mahesri and Vibhore Vardhan [6] have done varies power measurement in IBM ThinkPad R40 laptop and have use DVS technique to reduce the total consumed energy of the computer. The found out that the overall consumed power varies 8-10 W depending on the workload of the system. They concluded that DVS, a power management technique can considerably minimize CPU power consumption. The authors also noted that the Linux OS consume more energy than Windows OS, because Windows OS provides a user with a GUI which decides the power levels [6] adjusting to the system workload.

A project about energy management is made by Gernot Heiser and Aaron Carroll [8]. They developed an OS platform called Koala, which can support advanced DVS and FVS. They use CPU performance counters to make a prediction of the changes of the workload if they move it to a different core [8]. This prediction will be used by scheduling policy.

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According to the authors with this method we can save more than 30% energy with 4% of performance loss [8].

The final research that I have studied is made by Jacob Rubin Lorch. In his work he introduces PACE, which is an improved method of the existing DVS (dynamic voltage scaling) algorithms [15]. PACE replaces all the speed scheduling algorithms with another algorithm which has the same speed performance but have less energy consumption. According to the author implementing this new method is extremely effective by reducing CPU power consumption by average 21.6% while having no effects on performance [15]. He also suggests never execute blocked and delaying processes. This way can conserve CPU energy by 46-66% [15].

III. CONCLUSIONS

I have done a survey of some important and interesting researches about power consumption reducing techniques. Implementing our suggested techniques will increase battery lifetime, while having very little performance impact. Each of them suggests different method solutions with different results on conserved CPU power and performance impact. On my opinion the most effective methods are the ones suggested by Jacob R. Lorch and Alan Jay Smith, because we can save about 47-66% with a very little loss of performance. All these methods will be a solid base for future researches and works on this field.

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Business Type Classification via E-commerce Stage Model in Oil Industry in Iran

Mohammad Nassiry
Faculty of Information Science & Technology
University Kebangsaan Malaysia
Tehran, Iran

Prof. Dr. Muriati Mukhtar
Faculty of Information Science & Technology
University Kebangsaan Malaysia
Kuala Lumpur, Malaysia

***Abstract*— since the strategies and plans for e-commerce development are different for different industries and since the oil industry is one of the most important industries in Iran, the scope of this research is thus confined to that of the oil industry in Iran. The main aim of this study is to identify and classify the different features of e-commerce development stages and features based on the different business types present in companies in the oil industry in Iran. In order to achieve both of these objectives a questionnaire was developed and administered online. The questionnaire was distributed to forty representatives working in different companies. The collected data was classified and sorted and the priority e-commerce features was classified and displayed as triangles for each business type. Furthermore, the experts were asked to indicate the features which they implemented in their companies in order to know the most used features in each stage. The results of this study give an insight to the practice of e-commerce for Iranian oil companies and can be used to strategize future directions for the industry in terms of e-commerce.**

Keywords-component; E-commerce, E-business Model, E-commerce Stage Model, Business Types, Oil Industry

I. INTRODUCTION

The globalization of markets and ICT, specially internet technology, creates a cost effective platform for companies to communicate and conduct commerce. By the invention of computing technology and communication systems, E-commerce covers the business activities between company and customer via electronic media (Stair and Reynolds, 2008). Therefore, companies have invested heavily in Information Technology, mainly for making automatic external and internal processes, and communication such as payroll, accounting, financial, human resources, and production. The significance of electronic commerce and its impact on reducing costs and increasing income has made researchers give serious attention to electronic commerce in the past few years.

Oil, gas and petrochemical industries have a significant role in the world energy market. Information Technology had a strong effect on the oil industry in many ways and takes the benefits of e-commerce. IT infrastructure and Internet can support the exchange of information between the segments of the oil industry.

Therefore the researcher decided to conduct this study to organize and classify the features of e-commerce development stages based on their priorities for helping oil industry to handle their business activities in the most effective way.

II. LITRUTURE REVIEW

The literature review is focusing on three major areas. The first part explained E-commerce adoption models and e-commerce adoption in Iran. The second part of literature addresses development stages of e-commerce, a stage model and its features. The third area shows e-customer Chain Model in Oil Industry and classification of e-business items in oil industry.

A. E-commerce Adoption Model

E-commerce adoption could be examined and evaluated at any levels for the e-commerce successful implementation. Some of the frameworks and models like, Mosaic (1997), Mcconnell (2000), APEC (2000) and Harvard model (Kirkman et al., 2002), study of e-readiness at national and macro-level. Meanwhile, some of the e-commerce adoption variables refers mainly at the national or macro level is national or macro level is also referred in micro models like, Rashid and Qirim framework (Rashid & Qirim, 2001), the Ling model (Ling, 2001) and Wang and Tsai (Wang & Tasi, 2002). Therefore, e-commerce adoption might eventually be split on two distinct levels: (1) National level, and (2) Organizational level. (Elahi, Hassanzadeh, 2010), "A framework for evaluating electronic commerce adoption in Iranian companies", this model conducting the e-commerce is an extension to Tan et al (2007) and stresses on organizational or micro level e-commerce while some models emphasize on studying e-commerce at the macro or national level. Figure 2.1 shows a framework for evaluating electronic commerce adoption in Iranian companies.

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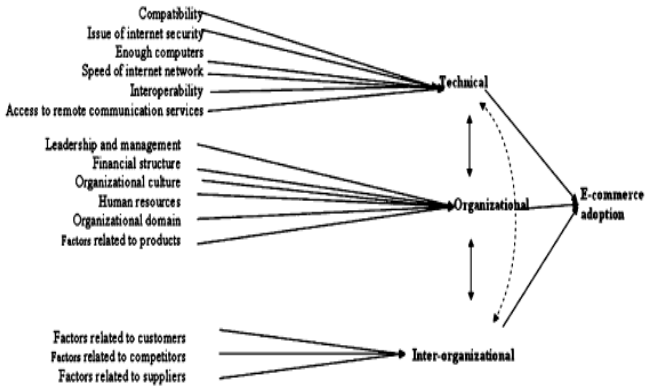
Figure 2.1 a framework for evaluating electronic commerce adoption in Iranian companies



According to Wu (2004) and Zulkifli (2001), the e-commerce adoption process starts with knowledge mind; continued by attitude training, decision-making and implementation. According to Rao, Metts, and Monge (2003) electronic commerce development and its implementation is taking place in 4 stages (1) Presence: at this stage

most businesses making their first steps in e-commerce by showing their business brochures and products offering on the web; (2) Portals: at this stage the portals is regarded as the introduction of two-way communication, client or vendor order placement, the use of profiling and cookies; (3)Transaction integration: this stage (TI) is distinguished from the portals stage primarily by the availability of financial transactions among partners; and (4) Enterprises integration: enterprises integration (EI) relate to full integration of business processes to the degree, which old-line business is identical from online business.

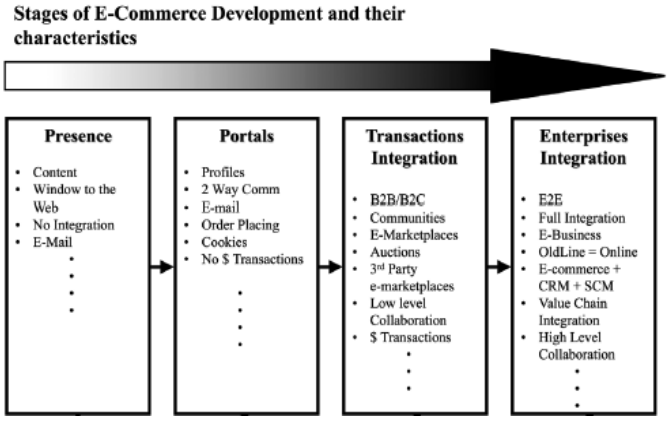
B. E-commerce Stage Model and their Features

A stage model is a set of descriptors, which characterize the evolving nature of electronic commerce. Such descriptors are for example, brochure, in-line catalogs, contact, one-way and 2-way communication, connection information, on-line banking transactions, etc.

Regarding the e-commerce adoption levels, there are various models of e-commerce development offered by a number of researchers, for instance, O'Connor and O'Keefe (1997) and Timmers (1999) explains the e-commerce business model. The first writers characterized the models by the degree of operations, transactions and the degree of content. Timmers (1999) featuring a business model by 2 dimensions: degree of innovation and degree of functional integration. The models explain how a company is using e-commerce to run their business "The E-commerce Maturity Model" (KPMG, 1997), "Stages of e-commerce development" (Rao, Metts, and Monge, 2003), "Ecommerce Adoption Model" (Daniel, Wilson and Myers, 2002), and "the Stages of Growth for E-Business" (SOGe) model (Prananto, McKay, and Marshall, 2003); each model with particular conditions and features in order to explain the levels of e-commerce adoption by enterprises. However, all of them agreed that a higher level would need to applications that are more complex and would produce more advantages than the previous stages.

According to Rao, Metts, and Monge, (2003), there are 4 stages of e-commerce development using that are the presence stage, portal stages, transaction integration stage and enterprises integration stages. Every stage has various features. Figure 2.2 shows e-commerce development stage model.

Figure 2.2 shows e-commerce development stage model



B.a. Presence Stage and its Features

Most businesses make their initial steps in electronic commerce by showing their corporate brochure and goods offering on a website (Timmers, 2000). The presence stage includes the first steps that businesses do to engage in the digital environment. A company should have a product which introduces itself and via this medium and has taken the necessary steps to ensure that the website is appealing and user friendly. Table 2.1 shows the features of Presence stage for e-commerce development stage that has been pointed by different scholar.

Table 2.1 the features of Presence stage for e-commerce development stage

No	Features	Sources
1	Content	Jeffacoate, 2000
2	Windows to the web	Barry, 2000
3	No Integration	O'Conner and O'Keefe, 1997
4	E-Mail	Timmers, 2000
5	Commitment	Roa. 2003

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B.b. Portals Stage and its Features

The portal stage is considered the introduction of two-way communication, client or vendor order placement, the use of cookies and profiles. The major difference between this stage and the presence stage is the ability of two-way communications between the company and clients (B2C) and between companies (B2B). The data in the presence stage may be combined with facilities for ordering, product information, and goods and quality surveys. This enables not only the attraction of new clients, but also enables the company to attract and keep visitors, and to relate them to their personal preferences for personalization purposes (Le and Koh, 2001). Another benefit of this stage is the ability to link information displayed through inventory information, and search features to users (Timmers, 1999). Table 2.2 shows the features of Portals stage for e-commerce development stage that has been pointed by different scholar.

Table 2.2 the features of Portals stage for e-commerce development stage

No	Features	Sources
1	Profile	Le and Koh, 2001
2	2-way communication:	Chapman, 2000
3	Order placing	Roa, 2003
4	Cookies	Koh, 2001
5	No money transaction	Roa and Metts. 2003
6	Usability	Le and Koh, 2001
7	E-mail	Monge 2003
8	Culture and language	Zhivago,2000

B.c. Transaction Integration Stage and its Features

The transactions integration stage is separate from the portals stage primarily by the presence of the financial transactions between the partners. This in turn required greater technical capacity, and therefore, the companies would face new challenges of overcoming.

An organization at this stage should have a higher level of technical capacity in order to perform the E-commerce business (Chesher and Skok, 2000). Table 2.3 shows the features of Transaction integration stage for e-commerce development stage that has been pointed by different scholar.

Table 2.3 the features of Transaction integration stage for e-commerce development stage

No	Features	Sources
1	Communities	Timmers, 2000
2	3rd party marketplace	Timmers, 2000
3	Auction	Bishop, 1999
4	Money transactions	Frakas-Conn, 1999
5	Low level collaboration	Chesher & Skok, 2000
6	Integration	Chesher & Skok, 2000
7	Competitive payment system	Fariselli, 1999
8	E-marketplace	Timmers, 2000
9	B2B/B2C	Timmers, 2000
10	Security and privacy	USSBA, 2000, Timmers, 2000, Bollo and Stumm, 1998

B.d. Enterprises Integration Stage and its Features

Enterprises integration is related to the full integration of the business processes to the extent that the old-line business is different from online business. This level of integration requires high levels of cooperation between clients and suppliers. Enterprises integration provides full integration of B2B and B2C business, including the value chain integration. This level of integration uses the E-commerce systems to managing the supply chain (SCM) and customer relationships (CRM). This level of integration is E-commerce + SCM + CRM. This stage is a bit of a perfect concept for the "E-global" environment. Many of the devices of this wise still have technical issues and over-whelming integration problems. Table 2.4 shows the features of Enterprises integration stage for e-commerce development stage that has been pointed by different scholar.

Table 2.4 the features of Enterprises integration stage for e-commerce development stage

No	Features	Sources
1	Full integration	Roa & Mette, 2003
2	E-business	Roa & Mette, 2003
3	Old line = Online	Roa, Mette & Monge, 2003
4	E-commerce +CRM+SCM	Lacerra et al, 1999, Krause et al, 1998

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5	Value chain integration	Roa & Mette, 2003
6	High level collaboration	Krause et al, 1998
7	E2E: End to End	Lacerra et al, 1999

C. E-customer Chain Model in Oil Industry

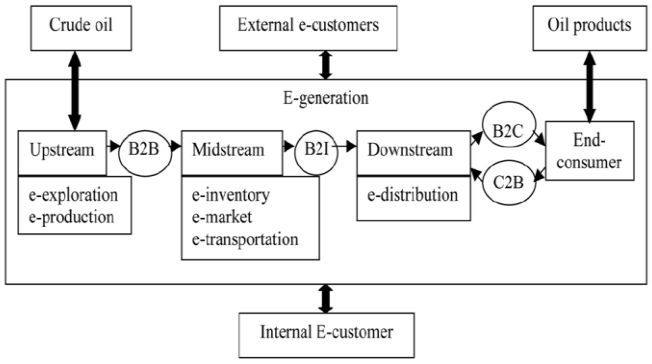
A key concept, which emphasizes the role of IT is customer chain (Wei, J, 2009). According to June Wei, 2009, electronic customer chain is defined as the use of firms IT infrastructure or Internet functions to share data with every member of the customer chain in order to ensure the improvement and synergies between the links in the chain.

The procedures within each stream (upstream, midstream, and downstream) are shown as electronic processes (e-processes) since every process should be carried out via electronic media (contains IT aid). The e-customer is the customer who is interacting with the oil and gas companies through electronic media.

The upstream operations for the exploration and production sectors which finding and producing petroleum and gas. The midstream segment shops, markets and transports goods including petroleum, gas and gas liquids. The downstream segment includes refining oil, petrochemical products, dealers, and petrol stations to distribute petroleum products to final e-consumer.

The three sectors (Downstream, Midstream, and Upstream) have a relationship as a customer or as a provider with the party that is next or preliminary to it in a supply chain. Some act as internal e-customers and certain external e-clients (Wei J, 2009). An external e-customer directly purchase the product or service from a company, such as the late e-consumer or in the case that an independent operator sells its product to a company in the midstream or downstream segment. Wei remains that an internal e-customer is a group in the distribution channel that gets processes, services and products from another in the organization. The various possible relationships can be classified in four e-business categories: business-to-business (B2B), consumer-to-business (C2B), business-to-consumer (B2C), and business-to-internal (B2I). Figure 2.3 shows an oil e-customer chain model development.

Figure 2.3 shows an oil e-customer chain model development



D. Classification of E-business items in Oil Industry

(Mihlmester and McKelvey, 2006) developed a set of e-business applications for the general energy services. (Ende and Wei2007, pp. 489-501) developed a set of e-business applications in the oil industry. According to Mihlmester and McKelvey's e-business applications and the expansion of the security items developed by Ende and Wei, of e-business model in oil industry (Wei and Ende, 2009), thirty-six e-business solution products in the oil industry are mapped and obtained from the developed e-customer chain model in terms of four e-business category comprising: B2B, B2C, C2B, and B2I. Each category has its own application, which can be implemented in the organization to enhance business worth on physical or information-processing components.

Based on the study of existing e-business solution items to these dominant companies, an e-business solution adoption triangle is built. The solution items that equal or more than 80% of the firms implemented are categorized as most commonly used elements (Most Adopted Items), these equal or less than 25% least frequently used elements (Least Adopted Items), and the remaining items (Enhanced Items).

III. RESEARCH METHODOLOGIES

The survey comes from the Roa research. The questionnaire was replicated in this research that has been designed based on the literatures "E-commerce development in SMEs, A stage model and its implications", and "Customer focused E-Business model for oil industry". The results of their studies show that the features and business types have been well identified and their model is a big and clarify the development stages of e-commerce in oil industry.

In this study, following the design of the questionnaire of the pilot test was carried out through e-mail by submitting this survey to a few experts in this area. They assist us with responding to questions and ask them to comment concerning the structure of the survey. This measure has set the validity of the content of our survey.

After this, the reliability of responses by applying Cronbach's alpha coefficient in SPSS was calculated.

Design Likert's scale questionnaire in connection with each development stage and its features and the responses will be based on each business types B2B, B2I, B2C and C2B and distribute online to IT experts in oil and petrochemical companies in Iran. Data collected from the questionnaire are analyzed and calculating composite score (mean, sum) to find importance of each features of e-commerce development stage from different business types in oil and petrochemical industries. Four different triangle s are designed for four existing business types based on the analysis of the data. Implemented of features stages of e-commerce development is defined based on the responds from the questionnaire.

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IV. DATA ANALYSIS

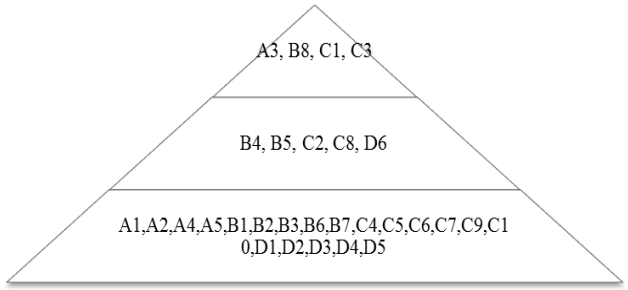
Data gathered from the questionnaire were analysed by using SPSS software version 19 and descriptive analysis through frequency statistic. We follow by measures of central tendency and location (mean and sum) for taking the result of importance features stages of e-commerce development by different business types. Based on the analysis of the data the priorities of features stages of e-commerce development in the oil industry and the implementation stages of e-commerce development in Iranian oil companies in this study will be analysed and explained. The next step following the end of the information collection is to organize the information into a useful form so that the trend, if any, arising from the information can be displayed easily.

Based on the examination of existing features of stages of e-commerce development for these dominant companies, a triangle for priorities of features of e-commerce development stage in each business type is constructed. The features that equal to or more than 80 of the composite score (sum) are classified as most important features (80 above), those equal to or less than 40 least important features (40 below), and the rest is medium priority features. With this result, every company knows about its priorities in the various stages of its internal and external communications.

A. Business Type Classification Triangle for Business to Business

In figure 4.1, from 30 features of e-commerce development stage the 21 most important features are A1, A2 ,A4, A5, B1, B2, B3, B6, B7, C4, C5, C6, C7, C9, C10, D1, D2, D3, D4 and D5 (SUM= 80 or above), which are usually found in the Presence, Portals, Transaction integration and Enterprises integration stages categories. The 4 least important features stages of e-commerce development are A3, B8, C1 and C3 (SUM= 40 or below). These features are shown in the Presence, Portals and Transaction integration stages categories. The 5 of the medium priority features are B4, B5, C2, C8 and D6 which shown in the Portals, Transaction integration and Enterprises integration stages categories. Moreover, 6 of thirty features stages of e-commerce development are the features that are the most important with highest rated among the analyzed companies by respondent experts (A2, B1, B2, C10, D1 and D5). The least commonly features are C1 and C3. Figure 4.1 shows the priorities features of e-commerce development in B2B.

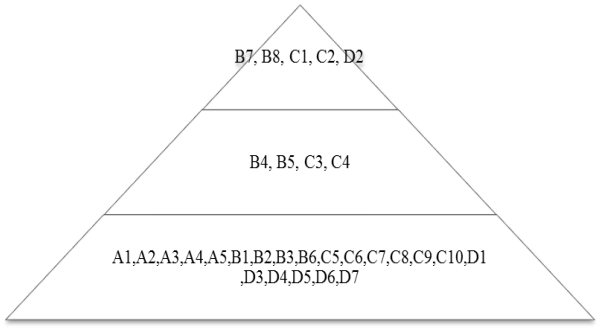
Figure 4.1 the priorities features of e-commerce development in B2B



B. Business Type Classification Triangle for Business to Internal

In figure 4.2, from 30 features of e-commerce development stage the 21 most important features are A1, A2, A3, A4, A5, B1, B2, B3, B6, C5, C6, C7, C8, C9, C10, D1, D3, D4, D5, D6 and D7 (SUM= 80 or above), which are usually found in the Presence, Portals, Transaction integration and Enterprises integration stages categories. The 5 least important features stages of e-commerce development are B7, B8, C1, C2 and D2 (SUM= 40 or below). These features are shown in the Portals, Transaction integration and Enterprises integration stages categories. The 4 of the medium priority features are B4, B5, C3 and C4 which shown in the Portals and Transaction integration stages categories. Moreover, 5 of thirty features stages of e-commerce development are the features that are the most important with highest rated among the analyzed companies by respondent experts (A5, B2, C10, D4 and D6). The least commonly feature is B8. Figure 4.2 shows the priorities features of e-commerce development in B2I.

Figure 4.2 the priorities features of e-commerce development in B2I



C. Business Type Classification Triangle for Business to Customer

In figure 4.3, from 30 features of e-commerce development stage the 12 most important features are A1, A2, A3, A4, A5, B1, B2, B6, C4, C6, C10 and D3 (SUM= 80 or above), which are usually found in the Presence, Portals, Transaction integration and Enterprises integration stages categories. The 8 least important features stages of e-commerce development

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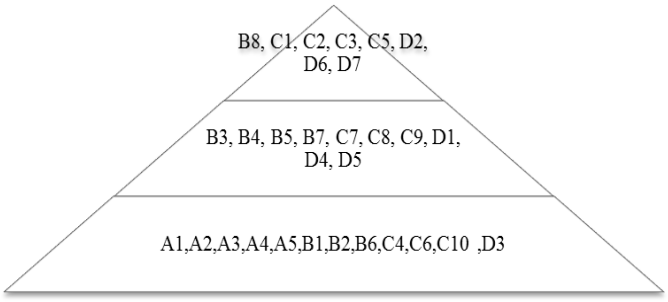
are B8, C1, C2, C3, C5, D2, D6 and D7 (SUM= 40 or below). These features are shown in the Portals, Transaction integration and Enterprises integration stages categories. The 10 of the medium priority features are B3, B4, B5, B7, C7, C8, C9, D1, D4 and D5 which shown in the Portals, Transaction integration and Enterprises integration stages categories. Moreover, 4 of thirty features stages of e-commerce development are the features that are the most important with highest rated among the analyzed companies by respondent experts (A1, A5, B1 and D3). The least commonly features are B8 and C5. Figure 4.3 shows the priorities features of e-commerce development in B2C.

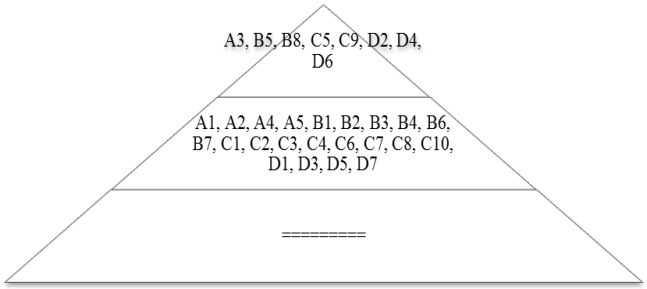
Figure 4.3 shows the priorities features of e-commerce development in B2C.



D. Business Type Classification Triangle for Customer to Business

In figure 4.4, from 30 features of e-commerce development stages the 0 most important features. The 8 least important features stages of e-commerce development are A3, B5, B8, C5, C9, D2, D4 and D6 (SUM= 40 or below). These features are shown in the Presence, Portals, Transaction integration and Enterprises integration stages categories. The 22 of the medium priority features are A1, A2, A4, A5, B1, B2, B3, B4, B6, B7, C1, C2, C3, C4, C6, C7, C8, C10, D1, D3, D5 and D7 which shown in the Presence, Portals, Transaction integration and Enterprises integration stages categories. Moreover, 1 of thirty features stages of e-commerce development is the feature that is the highest rated among the analyzed companies by respondent experts (B6). The least commonly feature is B8. Figure 4.4 shows the priorities features of e-commerce development in C2B.

Figure 4.4 the priorities features of e-commerce development in C2B



E. IMPLEMENTED FEATURES

The flexibility of these 31 oil and petrochemical companies' stages of e-commerce development implemented status was studied in the present research. The total number of features and percentages for each stages of e-commerce development (Presence, Portal, Transactions integration and Enterprises integration) from each business types (B2B,B2I,B2C and C2B) are presented in ascending order in the following tables.

Business type	Most implemented features In companies
B2B	A2, A4, A5, B1, B6, B7, C2, C4, C10, D2, D5
B2I	A1, A4, B1, B2, B5, B7, C2, C6, C8, C10, D2, D3, D5
B2C	A1, A2, A4, B1, B2, B4, B7, C2, C4, C6, C8, C10, D2, D3, D5
C2B	A1, A2, A4, B1, B3, B4, B7, C2, C3, C4, C7, C8, C10, D2, D3, D6

V. DISCUSSION AND CONCLUSION

The main results of this study are: a) discovering the priorities of features of e-commerce development stage in each business type. The outcome indicates that presence, portals and transactions integration are the most important stages for oil companies b) The most implemented features of e-commerce development stagein companies in each business type. The results from the current study indicate that the classification of features in the oil industry is critical to the success of the oil business activities. The main benefits of the results are presented below:

1. First, using this classification can simplify the flow of information, eliminate waste and reduce costs and times. So that the organization seeks satisfied during the oil and petrochemical industry. This business type classification through e-commerce stage model is used as a base for managers when considering business process redesign.

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2. Second, it can make managers aware of the number of implemented features in e-commerce is not as important as implementing the most important features. Implementing the most important features can make the company e-commerce process faster and more efficient.

A. Comparison of high priority features and implemented features

The comparison shows that although in B2B business type A1, B2, B3, C5, C6, C7, C9, D1, D3, D4 are high priority features, none of the companies are used these features. This issue is correct for the other business types. In B2I business type A2, A5, B3, B6, C5, C7, C9, D1, D3, D4 are high priority features, none of the companies are used these features. In B2C business type A3, A5, B6 are high priority features, none of the companies are used these features. In C2B business type A5, B2, B6, C1, C6, D1, D5, D7 are high priority features, none of the companies are used these features. Therefore, companies by implementing these features in their e-commerce system can increase their performance in customer relationship, document management, and procurement process.

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Mohammad Nassiry received his B.Sc. degree in IT in 2010 and he is doing his last semester in M.Sc. degree in MIS (Management Information System) in University Kebangsaan Malaysia. He is interested in E-Supply Chains, Business and system analysis, decision support system and Management of Information Technology
(E.mail: mnassiry62@gmail.com)

Assoc. Prof. Dr. Muriati Mukhtar is the head of research center for software technology and management (Softam) along with the head of service science research group in Faculty of Information Science & Technology in University Kebangsaan Malaysia. She obtained her PhD from UTMalaysia, SSn from UKMalaysia and BSc from UMIST. Her specialization areas are Service Science, E-Supply Chains and Simulation and Modeling. (E.mail: mm@ftsm.ukm.my)

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Vulnerability analysis of E-transactions in the Banking Industry, with a specific reference to malwares and types of attacks

Mrs T.K. George
Research Scholar, Department of Computer Science
Cochin University of Science and Technology

Dr.(Prof) Paulose Jacob
Dept.of Computer Science
Cochin University of Science and Technology

Abstract

One of the most important features of E-banking is to deliver the new banking services & products to the extended customer database by the effective use of internet technology with a lesser transaction cost and without the traditional constraints on time and place. E-banking makes use of computers and related technologies to retrieve and process the transactions with a bank or other financial service providers. In order to reduce the potential vulnerabilities against the security, many vendors have developed various solutions in both software-based and hardware-based systems. Finding a solution, to patch up security holes, is a quintessential element for the future of the banking Industry.

Key words*: E-banking, transactions, constraints, patch, security, Vulnerability*

Introduction:

In E-banking, the products and services are given to the users through electronic delivery channels with a reduced cost and improved efficiency. Most of the banks are focusing on extensive computerization and use of electronic transactions, which will be ideal for meeting customers' expectations and having faster transaction management. Internet and other infrastructure facilities have created new commercial opportunities for e–banking. E–banking is a convenient service offered at minimal cost. It is a major transition from traditional practices in banking, the one in which the bank can be connected to the customers at any place & time through internet applications. High performance and faster delivery of product are some of the major advantages of e- banking. The convenience associated with electronic banking will attract more customers. In order to provide effective and secure banking transactions, there are certain issues which have to be resolved. Security of the transactions is the primary concern of the internet-based industries [1]. If the mechanism for handling the Anonymity (Privacy) is strong, it will ensure the secrecy of the sender's personal information directly, which will thus enhance the security of the transactions. An appropriate authentication mechanism, along with a secured Encryption, can make the transactions more secure and will make sure that no one will alter the data at either end of the transaction [2]. The integrity of the message can be verified by using the secure Hash algorithm which is "a check that protects data against most modification". Another method of verification, is through a third party called Certification Authority (CA) with the trust of both the sender and receiver, verifies the authenticity of the electronic currency or the digital signature that they received.
Automation of banking services can support significant saving of time and transaction cost, without requiring the

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physical interaction with the bank. Information access can be handled faster and continuous interaction of transaction details are made available round the clock.
E-banking provides better fund management which will increase the efficiency of business processes due to wide variety of cash management tools available on the communication link.
E-banking gives enormous supports to the banks to retain their existing customers with highest level of customer satisfaction, increase market share, minimized administrative & transaction cost and improve the banks' competitive position[3].

Major concerns in E-banking

- Adoption of Global Technology to the local requirement with an adequate level of infrastructure, working capital, expertise technical support team.
- Appropriate management of security constraints such as Confidentiality, Integrity and Authentication and its Communication across different platforms through an insecure channel.
- Trust worthy and reliable infrastructure for e-payment process.
- Implementation of E-commerce security by categorizing it into a three-tier model such as security on client, security on server and security on database.
- Public support for e-finance and related initiatives both from public and private sector.

The Security of data transfer and maximisation of the communication channel are very important concerns in e-transactions and it has the highest demand from the customer point of view. Customer will not accept services which do not provide enough security & privacy[4].
Remote accessing facility, high performance and flexibility are some of the important factors which support the popularity of e-transaction. But customers really look into the security aspects. If it is supported with an appropriate mechanism within the secured communication channel, the e-transaction can be trust worthy and useful for the entire society.

Possible types of Attacks on E-banking transactions:

Attack at the time of sensitive information transfer and unauthorized accessing of financial and sensitive personal data are the major threats in e-banking, which will have a direct impact on the Confidentiality, Integrity and Availability aspect of the Security Triangle [5]. As per one of the research study conducted, it is highly advisable to have a secured communication channel with a secure protocol [6]. It is very difficult to find such system in most of the environment of e-banking transactions. Some of the most frequent types of attacks are mentioned below:

Social Engineering attack

This type of attack does not involve knowledge, but tricks the customer into providing sensitive information, by behaving as a system legitimate user. The Social engineers impersonate him for collecting information that would allow them to access individual users account details.

Using Port Scanners

In this type of attack, the attacker uses various techniques to steal the sensitive information, by sending different types of signals to the system to retrieve the message and get the acknowledgement to ensure the details of the communication channel. The main focus is to collect the important information related to hardware and software used by the system to plan

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ahead for the type of attack, which can be performed on such system.

Packet Sniffers:

In the absence of a Secure Socket Layer, the attacker can use a packet sniffer utility to gather the sensitive data related to online transactions, which is passed through the insecure network channel. Since there is no data manipulation taking place it is very difficult to detect this type of attack.

Password Cracking

The attacker can use utilities such as Brute force password attack or a hash table to decrypt the password. By using this vulnerable method, the attacker can misuse the important credentials related to username & password and make an illegal entry to the legal online transaction.

Trojans

It is the most dangerous malicious software in e-transaction which steals confidential information. It can be made available in all types of data communication channels including, emails and messaging system. In the recent days the percentage of the computer system affected by this malware is increasing drastically.

Denial of Service Attack

By overloading a server or duplicating and sending hundreds of request to the server at the same time, having the intention of stopping the accessibility of legal user with the web server [7]. The attacker usually tries to interrupt the service of the webserver of the competitor with a legal user, with the support of a malware. Once the server is down, the attacker takes charge of the system and disables the important security features. There can be server bugs in the system, and if there no appropriate measures taken for timely updating or patching the system, chances are there for an attacker to generate a threat using this vulnerability.

Flaws in banking websites

According to the research conducted by University of Michigan, more than 35 % of bank websites have some sort of design flaw, which is difficult to detect and patch. Information leaking ,Cross site scripting and SQL injections were the most frequently found vulnerabilities in the web applications reported by White Hat in 2011.If the webpages are insure there is a chance of ‘man-in-the-middle’ attack[8].

Security and Privacy Issues

Communication Security and Computer Security are the most important terms in internet banking, where Computer Security keeps track of computing resources against the unauthorized use and protects them against destruction, disclosure and modification. Protection of data during transmission on the network is placed under Communication Security. During the authentication process we can verify the identity of the user and other resources involved in the transaction. Protection of the resources against unauthorized access can be implemented by using an appropriate access control mechanism by which the theft of funds, compromising data confidentiality, denial of service can be avoided. Because of the open access of resources in the internet, providing data confidentiality is an important task during transmission, most of the sensitive information can be captured even with a simple sniffer utility [9]. To ensure the Data Integrity there can be an appropriate access control mechanism and an effective encryption method. There should be a *Security Audit Trail* to test for efficiency and also detect breaches in security. There should be an acceptable level of protection mechanism in order to conduct safer transaction. Even though there are new security techniques which safeguard cracking, there are loopholes. If the computer system is not configured to stop the attack or if the security patches are not installed effectively, it will give way to the hackers, to break into the system.

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Need for security patches:

A secure transaction requires secure protocols on the communication channel. In order to provide security there are software and hardware based solutions available. In Software-Based security Systems encryption is the main technology, which deals with the security aspects. Secure Electronic Transaction, Pretty Good Privacy, Digital signature and Kerberos are some of the important encryption methods. In hardware-based security system identification of credentials are secured from unauthorized users, through mechanical devices such as the Smartcard system and the MeCHIP[10].

Defenses to mitigate vulnerabilities:

Some of the important defensive mechanisms to mitigate vulnerabilities are[11]:

- Educate the users to have a good judgment on disclosing the important information and make them aware of the various categories of attacks such as Phishing and Social Engineering. Providers of the service must be educated to have effective utilization of the facilities.
- Make use of personal firewalls, which can have a control on the traffic.
- Server client communication and the browser security can be assured with the help of a Secure Socket Layer.
- Implement appropriate password policies for the users of the system.
- Effective mechanisms must be adopted to detect the probable attackers and analyse the security provided in the communication channel.
- Security logs can be provided to record the unauthorized access to systems and to take actions based on the recorded entry in the logs.
- An Information Security Officer or a Security Auditor, who will be able to test or take care of some of the following issues such as: back door traps, pass word cracking, Denial of Service, holes in software, penetration testing, access control, backup and record keeping facilities, should be designated.

Possible solution suggested for patching up the security holes.

- *Receiving and reconfirming a secret code through a mobile communication link (Authentication with a Message):*

A strict two factor authentication system can be introduced during log on process of the customer to verify the user credentials and generate a secret code by the system supported by the bank. Receiving & Reconfirming the code can be done through a Short message services using the mobile phones of the user. At a Certain extend the Man in the middle attack can be mitigated using the mechanism. Since Mobile phones are already available with most of the users and the contact numbers are already recorded in the banking database, it will not be an additional burden for the customers to do receive and reconfirm the secret code generated. It may increase the confidential level of the customer to complete the transaction effectively. But it is not completely free from attack, if it is not handled in secured communication session.

- *Verification of a secret code with an image attached with it.(Secret code with image)*

In 2005, Bank of America introduced a pass mark enabled web service system based on the image with a shared secret phrase, between the customer and the

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transaction provider [20].During the authentication phase a device-id is created along with the user credential and verified it with a encrypted service. If there is match, then the user login page can be submitted along with a image and secret caption attached with it. In this type of verification mechanism, the customer will feel that, they are in a secure page of transaction. But if the system is infected with a malware such as Trojan horse, the*

- *Photographic image on the password window (Image on the password window).*

This image verification approach was introduced by R.Dhamija and J.D. Tygar. A unique graphical image, supported with a hashing technique will be available on a web form which is placed in reliable password window [21], which is placed in#

- *Authentication mechanism by Public Key infrastructure (PKI).*

An appropriate mutual authentication of client and server can be done with the implementation of a Public Key Infrastructure (PKI) supported with a strong cryptography. This can reduce the man in the middle attack. But secure distribution of a client certificates on the communication channel can be at risk, if it not handled through a secure communication channel. A hardware token with PKI is an alternative option for providing the safer authentication for an online transaction, which is also not completely safe from Trojan horse. One of the proposals by Hiltgen et al indicates that a two stage authentication can be done with a smart card PKI based implementation [15]. A proper authentication can reduce the intensity of a impersonate attack. The following table can give a better picture of the above mentioned suggested analysis.

*attacker can easily create website spoofing attack and can establish an interaction session with the user by mimicking the actual online site. There should an appropriate mechanism to take care of the malwares and the real online banking server should not trust the client IP address for any authentication process by the supporting servers of the providers, during the transaction process.

a dynamic secure session. Usually this is very difficult for an attacker to conduct a spoofing attack; lack of mutual authentication can be one of the draw backs of this system. If there is an effective Secure Socket Layer, it can override the attacker's attempt of illegal entry and provide the secure measures to stop the man in the middle attack.

	Authentication with a Message	**Secret code with image**	**Graphical Image on password window**	**PKI**
User Acceptance	Average	Strong	Strong	Average
Security Breach	Average	Weak	Weak	Average
Cost of Implementation	Average	Weak	Average	Weak
Portability	Average	Strong	Average	Weak
Spoofing	Yes	Yes	Yes	Yes
Man In the Middle Attack	Depends	No	Depends	Depends

TABLE 1. Comparison of methods to patch up security holes

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Recommended Technology and Security Standards:

- Secure the information system with latest versions of patches and licensed versions of software with an appropriate user role assigned and supported with an effective backup facility.
- Logical access control can be provided, which may include user-ids, password, smartcard or any other biometric technologies.
- 'Proxy server' type of firewall to provide a high level control and monitoring, which can analyze the data packet transfer details.
- Introduction of a Public Key Infrastructure, favored technology for secure banking transaction.
- Application server should be isolated; other server services can be disabled.
- Appropriate certification of security products from the concerned agencies.
- Appropriate evaluation from RBI regarding the security aspects then to follow the security policies and operational manual.

Conclusions

There is lack of security controls and misuse of confidential data during e-transactions, which may affect the confidentiality of the business transactions. With the help of existing modern technology there can be a secure frame work for dealing with the security threats through a different approach, where the consumer can get a transparent system to boost up their confidence level. Potential vulnerabilities can be reduced with the appropriate use of security patches by which security issues can be mitigated. Lack of standard security policies and quality of end-user terminal must contribute positively, to rectify the design flaws in the websites.

In one of the Surveys conducted by DSCI-KPMG in 2010, the following security tips which pops up on most of the internet sites, direct the consumers to perform secure e-transactions by which the amount of vulnerability can be mitigated [16].

- Before giving out the sensitive data, check whether you are using a reliable platform and you are not using any popup windows.
- Make use of the latest version of Operating system and browsers, with appropriate security updates.
- Make sure that the computer system, which you are using for your transaction are malware free and Installed with an appropriate firewall for providing the protection.
- Careful management of sensitive credentials and should not use the same password for a long duration is also an important factor to prevent the malicious attack.

The security and protection of information exchanged between customer and the bank seems to be a difficult task in e-banking. Malware such as man in the middle attack, spoofing and DNS hijacking cannot be eradicated completely instead it can be mitigated by detecting it on time. The effectiveness of the e-banking depends on its confidentiality, Integrity and accountability. If there is a flawless security measure from the provider of the transaction as well as from the user, there can be 100% security [17]. If the server is insecure and the users are exposed to various threats, definitely the security will be at risk!

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Hybrid Encryption Technique Using RSA with SHA-1 Algorithm in Data-At-Rest and Data-In-Motion Level

Aarthi.G
Research scholar
Mother Therasa Women University
Kodaikanal, Tamil Nadu, India.

Dr. E. Ramaraj
Professor, Dept. Of Computer Sci.& Engg.
Alagappa University
Karaikudi, Tamil Nadu, India.

Abstract- Data base security is the mechanisms that protect the data base against intentional or accidental threats. It is also a specialty within the broader discipline of computer security using encryption techniques. Encryption is one of the security methods in database security. To secure the data, it is an essential to propose a new methodology to avoid such kind of attacks for securing the data-at-rest and data-in-motion level. This paper proposes a hybrid encryption technique for secure the database. The proposed hybrid encryption technique used to secure data-at-rest and data-in-motion level with RSA and SHA-1algorithms that led to strong security. The aim of the proposed hybrid encryption technique is to provide better confidentiality, integrity and availability among other security protocols.

Keywords- Data-at-rest; Data-in-motion; RSA; SHA-1; Hybrid Encryption.

I. INTRODUCTION

Security is one of the important aspects in computing. In data transfer, security must be considered as one of the method implemented to ensure secure data transfer. Data transfer is transferring information from a location or host to another host, or server. To have a secure data transfer, few methods are available, and one of them is encryption of data, that transferred in encrypted way and decrypted wherever it is used.

It concerns the use of a broad range of information security controls to protect databases (potentially including the data, the database applications or stored functions, the database systems, the database servers and the associated network links) against compromises of their confidentiality, integrity and availability. It involves various types or categories of controls, such as technical, procedural/administrative. Database security is a specialist topic within the broader realms of computer security, information security and risk management.

The art and science of keeping messages secure is called cryptography [1]. It is practiced by cryptographers, and cryptanalyst are practitioners of cryptanalysis. A message is plaintext or clear text. The branch of mathematics encompassing both cryptology and cryptanalysis is cryptology and cryptologists practice it. In cryptography, a key is a piece of information that determines the functional output of a cryptographic algorithm or cipher without a key the algorithm would produce no useful result.

There are many aspects to secure applications, that ranging from secure commerce and payments to private communications and protecting passwords. One effective aspect for secure communications is that of cryptography. It is important to note that while cryptography is necessary for secure communications, it is not by itself sufficient.

A method of encryption that combines two or more encryption schemes includes a combination of symmetric and asymmetric encryption to take advantage of the strengths of each type of encryption. Hybrid encryption technique has the advantages of both symmetric and asymmetric algorithms.

Symmetric algorithms are used for encryption of messages rather than asymmetric because the asymmetric algorithms are slower than to compare symmetric algorithms. Thus asymmetric algorithm RSA is used in this paper to safeguard the secret key which solves the problem of key exchange as in secured way.

The secret key can't be decrypted unless a private key is obtained and since it is at receiver side it is highly secured. The strengths and weaknesses of symmetric encryption and asymmetric encryption are that it can combines two and realize hybrid encryption. It is a schematic diagram of an asymmetric encryption.

In that paper [4], it can see that hybrid encryption technology overcomes not only the difficulties that symmetric encryption transmits keys but also the disadvantage that asymmetric encryption does not apply to large amount of data. The advantages of both can be fully integrated Hybrid Encryption Technique Using RSA with SHA-1 Algorithm in Data-At-Rest and Data-In-Motion Level [hybrid encryption technique using RSA with SHA-1 algorithm in Data-at-Rest and Data-in-Motion level].

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To create a hybrid encryption, the algorithm will be enhanced with two more algorithms to encrypt the data exactly at three times using stack method and Stenography.

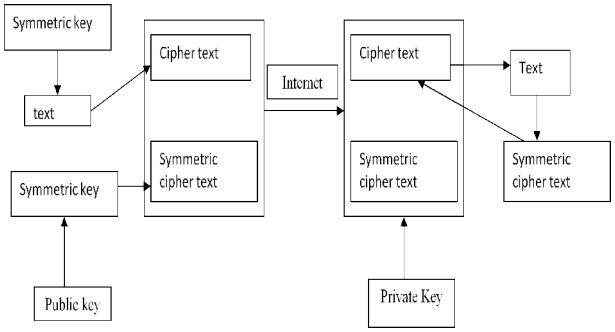

Fig.1. Encryption technique

II. DATA BASE ENCRYPTION

A database [3] is an organized collection of data. That allows data to be easily accessed, manipulated and updated. In other words, a database is used by an organization as a method of storing, managing and retrieving information. Modern databases are managed using a database management system (DBMS).

Database encryption is the process of converting data, within a database, in plain text format into a meaningless cipher text by means of a suitable algorithm. Database decryption is converting the meaningless cipher text into the original information using keys generated by the encryption algorithms. Database encryption can also be provided at the file or column level. Because of encryption is playing more and more of an important role in database management systems, the Database administrators are implementing the encryption methodology in their databases.

The following steps are requires for encrypting a database:

1. Determine the criticality of the need for encryption
2. Determine what data needs to be encrypted
3. Determine which algorithms best suit the encryption standard
4. Determine how the keys will be managed

Numerous algorithms are used for encryption. These algorithms generate keys related to the encrypted data. These keys set a link between the encryption and decryption procedures. The encrypted data can be decrypted only by using these keys.

Different databases, such as SQL, Oracle, Access and DB2, have unique encryption and decryption methods.

Database encryption refers to the use encryption techniques to transform a plain text database into a (partially) encrypted database, thus making it unreadable to anyone except those who possess the knowledge of the encryption key(s).

Data secure using encryption technology affects five factors.

1. Security.
2. Performance
3. Flexibility
4. Manageability
5. Availability

The encoding of the data by a special algorithm that renders the data unreadable by any program without the decryption key.

To provide the necessary facilities or mechanisms for DBMS to implement a database cryptosystem, it must offer the following:

- **Encryption Algorithms** - of course any DBMS that wishes to implement encryption must contain the actual encryption and decryption algorithm(s)
- **Key Management** - the system must provide the facility for the management of the keys used for encryption and decryption
- **Authentication and Authorization** -when the data send through a sender to encrypt or decrypt data, generate or use a key, and/or generate or use a certificate, the DBMS should authenticate the sender and then make sure the sender has permission to perform the particular action. Furthermore, a check should be performed to ensure that the principle (the entity that is accessing the database) has access to view the encrypted data (cipher text).

There are two major categories of data which can be encrypted, and an organization will have to determine if it wants to protect database. They are:

- Data-in-motion
- Data-at-rest

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Data-in-motion [4] refers to data that is being sent to and from the database, i.e. to/from a sender application over the Internet or local intranet. DBMS usually make use of SSL (Secure Sockets Layer), TLS (Transport Layer Security), and/or IPSEC (Secure Internet Protocol) to protect data-in-motion.

The protection of data-in-motion is necessary to keep secret the data being sent to or from a sender, and to protect against certain types of attacks (i.e. session hijacking and replay attacks). The other category of encrypted data, data-at-rest, has to do with the encryption of data inside of the database itself. Most attacks do not occur on data-in-motion.

Most attacks occur against the end points of data, where data sits for long periods of time. The encryption can be a DBAôs last line of defense - if an attacker gets a hold of the actual data at rest.

If an organization decides to encrypt its data-at-rest, it must decide at what degree of granularity to encrypt the data. A list of possible encryption levels are listed below, along with their possible advantages and disadvantages:

- **Database Level** - this would entail encrypting at least one (usually large) file, which represents the database in its entirety. One advantage to this level of encryption is the fact that all data is secure. However, its biggest advantage turns out to be its biggest disadvantage. Every time data must be written or read from the *entire* database must be decrypted. Obviously, this will incur a very high overhead and is a less than desirable solution.

- **Row or Column Level** - row or column encryption is the encryption of only certain rows or columns inside a table. It is the level of data encryption that tries to addresses the disadvantages of the previously mentioned type. However, care should be given to the choice of columns to encrypt. For example, if the sender chose to encrypt a column that is being referenced within a SQL statement's WHERE clause or is a primary key, the database will be forced to decrypt that column's data before it can do any comparisons.

A. Hash function

The hash function is a deterministic procedure that takes an arbitrary block of data and returns a fixed size bit string the (cryptography) hash value, such that an accidental or intentional change to that data will change the hash value.

- The data to be enclosed is often, and the hash value is sometimes called the ñsimply digestò

The ideal hash function has four significant properties:

- It is easy to compute the hash value for any given message.

- It is infeasible to generate a message that has a given hash

- It is infeasible to modify a message without changing the hash.

- It is infeasible to find two different messages with the same hash.

B. Message digests algorithm and digital signature

- Message digest algorithm is the one ï way hash function that produces a fixed ï length string (hash) from an arbitrary ï sized message. Itôs computationally infeasible that there is another message with the same digest; the digest does not reveal anything about the message.

- Digital signature consists of two parts: a string of bits that is computed from the message and the private key of organization. Digital signature is used to verify that the message comes from this organization.

III. OBJECTIVES OF HYBRID ENCRYPTION DATA BASE SECURITY

Data encryption can enhance security both inside and outside the database. A sender may have a legitimate need for access to most columns of a table, but if one of the columns is encrypted and the sender does not know the encryption key, the information is not usable. The same concern is true for information that needs to be sent securely over a network.

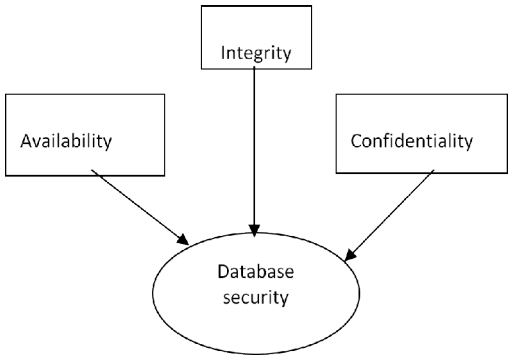

Fig.2. Database Security

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The techniques presented so far in this paper, including authentication, authorization, and auditing, ensure legitimate access to data from a database sender but do not prevent access to an operating system sender that may have access to the operating system files that compose the database itself.

Database security [3] is the system, processes, and procedures that protect a database from unintended activity. Database security is also a specialty within the broader discipline of computer security.

Encryption is one of the security methods in data base security. There are major three points involves the database security.

Databases provide many layers and types of information security, typically specified in the data dictionary, including:

- Access control
- Auditing
- Authentication
- Encryption

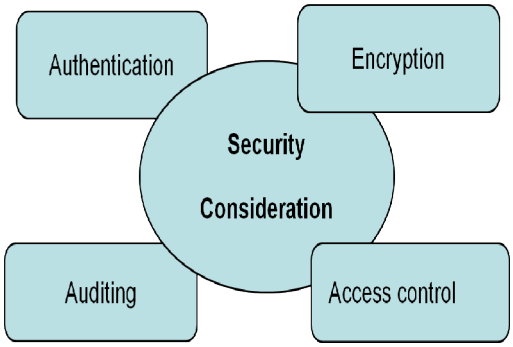

Fig.3. Encryption in Data base security

A. Access control

Access control ensures all communications with the databases and other system objects are according to the policies and controls defined. This makes sure that no interference occurs by any attacker neither internally nor externally and thus, protects the databases from potential errors that can make impact as big as stopping firmôs operations.

Access control also helps in minimizing the risks that may directly impact the security of the database on the main servers. For example, if any table is accidentally deleted or access is modified the results can be roll backed or for certain files, access control can restrict their deletion.

B. *Auditing*

Accountability and audit checks are required to ensure physical integrity of the data which requires defined access to the databases and that is managed through auditing and record keeping. It also helps in analysis of information held on servers for authentication, accounting and access of a sender.

C. Authentication

Sender identification and authentication is the basic necessity to ensure security since the identification me-thod defines a set of people that are allowed to access data and provides a complete mechanism of accessibility.

To ensure security, the identity is authenticated and it keeps the sensitive data safe and from being modified by any ordinary sender.

D. Encryption

Encryption [1] is the process of concealing or transforming information by means of a cipher or a code so that it becomes unreadable to all other people except those who hold a key to the information. The resulting encoded information is called as encrypted information.

Data at Rest encryption secures confidential data stored on networked servers from attackers who already have or easily gain access to the data. Encryption of the data can provide strong security, but it needs development of an encryption strategy taking many factors into consideration such as encryption key management, access control and authentication, defining sensitive data and performing encryption.

It refers to the transfer of that data between all these copies and versions of the original file, such a data traversing the internet. In other words , data- in ï motion also known as data in transit , in filtering information that is moving through a network. Encryption of data in motion is protecting the contents of that e-mail by using data encryption software.

IV. DATA-AT-REST

The former category refers to encrypt data when it is statically stored in a database server. The main objective to implement this is to prevent unauthorized party from reading through information that should be kept as secret. It is claimed that most attacks onto database occur when the data is sit at rest. According to data stay for longer period of time inside a database server, compared to while it is being transferred between the server and senders. Hence, a lot of efforts have been put in this area.

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The operation of securing data-at-rest involves transforming sensitive data into unintelligible forms, so that it is only readable by authorized parties. Sensitive data are encrypted as soon as it is stored in the database. Upon leaving the database, however, the data will be transformed back into plain text. As such, the data are always at risk of disclosure while in transfer, excepting if a secure communication channel is set between the sender application and the database server. The database, or eavesdrop the Integrity controls Encrypting.

V. DATA-IN-MOTION

Encrypting data-in-motion solve the problem raises up by the former database securing category. It plays an important role to protect data while they are being transmitted through communication channels. Critical information is protected through a secure connection established by the two communicating end points. To securely transmit data-in-motion; there are a few options applicable, such as Secure Internet Protocol (IP Sec).The most common standard that database vendors adapted to is Secure Sockets Layer (SSL), or the follow on Internet standard known as Transport Layer Security (TLS).

VI. RSA ALGORITHM

RSA [5] algorithm is a public key algorithm. It is invented in 1977 by Ron Rivest, Adi Shamir and Leonard Adleman (RSA). It Supports Encryption and Digital Signatures. The Most widely used public key algorithm. To demonstrate that confidentiality and send-er-authentication can be achieved simultaneously with public-key cryptography. RSA gets its security from integer factorization problem and relatively easy to understand and implement.

VII. SHA-1 ALGORITHM

SHA-1[6] is an encryption algorithm. It is a two way algorithm meaning that you can take the encrypted value, and decrypt the value to get the original plain text value back. This algorithm provides a good level of security for data, and is a standard algorithm which is used to protect credit card data when it is stored within a database. The Secure Hash Algorithm takes a message of less than 264 bits in length and produces a 160-bit message digest.

VIII. EXISTING SYSTEM

The Hybrid system is implemented as distributed processes that scale with the number of processors and database server available. In the Software topology the database server becomes the platform for encryption services, removing the network and a remote device from the equation. When the application calls for secure information, the encryption service requests the encrypted data from the database server, performs a local decryption, and returns clear-text information to the calling application. All network overhead and encryption (e.g. SSL) has been eliminated from the critical path, optimizing the response time and throughput. In addition, since it is not using a separate hardware device there isn't any set-up overhead.

Since several years, most DBMS manufacturers provide native encryption capabilities that enable application developers to include additional measures of data security through selective encryption of stored data. Such native capabilities take the form of encryption toolkits or packages (Oracle8i/9i), functions that can be embedded in SQL statements (IBM DB2), or extensions of SQL (Sybase and SQL Server 2005).

To limit performance overhead, selective encryption can be generally done at the column level but may involve changing the database schema to accommodate binary data resulting from the encryption process.

SQL Server 2008 introduces transparent data encryption (TDE) which is actually very similar to storage-level encryption. The whole database is protected by a single key (DEK for Database Encryption Key), itself protected by more complex means, including the possibility to use HSM. TDE performs all of the cryptographic operations at the I/O level, but within the database system, and removes any need for application developers to create custom code to encrypt and decrypt data.

TDE (same name as SQL Server but different functionalities) has been introduced in Oracle10g/11g, greatly enlarging the possibilities of using cryptography within the DBMS. Encryption keys can now be managed by a HSM or be stored in an external file named wallet which is encrypted using an administratively defined password.

Selective encryption can be done at the column granularity or larger (table space, i.e., set of data files corresponding to one or several tables and indexes).

To avoid the analysis of encrypted data, Oracle proposes to include in the encryption process a *Salt*, a random 16 bytes string stored with each encrypted attribute value.

An interesting, but rather dangerous, feature is the possibility to use encryption mode that preserve equality (typically a CBC mode with a constant initialization vector), thus allowing, for instance, to use indexes for equality predicates encrypting the searched value.

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The database-level encryption with security server approach mentioned above is proposed by IBM DB2 with the Data Encryption Expert (DEE) and by third-party vendors like Protegrity [7], RSA BSAFE and Safe Net (appliance-based solution). The third-party vendorsô products can adapt to most DBMS engine (Oracle, IBM DB2, SQL Server and Sybase).

IX. PROPOSED SYSTEM

This paper provides an innovative approach for database security using encryption & decryption method. This cryptography approach enables the additional database security mechanism for improving the complexity of data. The aim of the proposed hybrid encryption technique is to provide better confidentiality among other security protocols. And the hybrid encryption technique is a combination of symmetric encryption and asymmetric encryption.

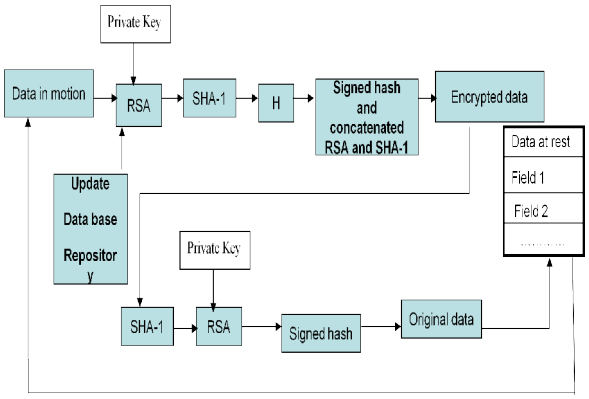

Fig.4. Hybrid Encryption

In this hybrid encryption module, the information sent from the sender is to be encrypted using symmetric encryption algorithm with the key value. The sender who uses the receiver public key with RSA algorithm encrypts the key value. Both the encoded values are sent to the public network. The receiver receives the encoded values and uses his private key value with RSA [2] to decrypt and identify the actual value. The actual key is decoded with symmetric key algorithm to identify the original information.

The main problem of any public key based security system is to make senderôs public key available to other senders in such a way that the authenticity is verifiable. In the primary level the original data are stored at the data-at- rest level. The data-at-rest level is the archive file format. Then, the dataôs are moved to the data-in-motion level. In, the data in motion level, the client fetch the original data in the data field using E= (T+R+C). Then, the original dataôs are sending to the application server. The sender sends the data using the clientôs private key.

Now, the digital signature algorithm does starts. The digital signature is provides the authenticity. It involves the use of a hash code using SHA-1 (secure hash algorithm) Hashing algorithm and a RSA public key encryption algorithm. When, the SHA-1hashing algorithm has initially starts. Next the clientôs private key with RSA key cryptography has joined in the trip. Both are SHA-1 and RSA has concatenated the form of hash signed key.

When the SHA-1 (secure hash algorithm) is starts, the digital signature algorithm also starts already saved the original data and did match the correct data, if they are equal the encryption functions are starts at the execution level, but not match thus the process are disconnected.

If the correct data, they are generates a hash code of the message using hash algorithm such as SHA-1. Hash code using the clientôs private key with RSA public key cryptography algorithm.

The encrypted hash code is concatenated to the form of hash signed key. This algorithm is used on the data encryption method. Now, the encryption is available so, initially the encryption function is starts. Then, the situation the SHA-1 function can generate a hash code for the original data.

In other words, SHA-1 generates the new value to the encrypted data for it doesnôt find the unauthorized access. If, the sender have doesnôt use the SHA-1 hash algorithm the theft is easily find out that the original data. Then the application server decrypts the hash code using clientôs public key cryptography algorithm. And generates a new hash code for the received data and compares it with the decrypted hash code. If the two are match, the data is accepted and reliable.

X. CONCLUSION

The proposed system of the hybrid encryption technique is highly secured the data-at-rest and motion used in various applications such as banking, insurance systems, core banking, and web based applications. So these methods proposed the strong security using RSA and SHA-1 algorithm.

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Efficiency Analysis of Materialized views in Data Warehouse Using Self-maintenance

Mehwish Aziz / Student at
Govt Post Graduate College, S/town, Rawalpindi

Shabnam Nawaz / Student at
Govt Post Graduate College, S/town, Rawalpindi

Pakeeza Batool / Lecturer in
Govt Post Graduate College, S/town, Rawalpindi
Department of Information Technology

***Abstract*— A data warehouse is a large data repository for the purpose of analysis and decision making in organizations. To improve the query performance and to get fast access to the data, data is stored as materialized views (MV) in the data warehouse. When data at source gets updated, the materialized views also need to be updated. In this paper, we focus on the problem of maintenance of these materialized views and address the issue of finding such auxiliary views (AV) that together with the materialized views make the data self-maintainable and take minimal space. We propose an algorithm that uses key and referential constraints which reduces the total number of tuples in auxiliary views and uses idea of information sharing between these auxiliary views to further reduce number of auxiliary views.**

Keywords—Materialized views (MV), Auxiliary views (AVs), Referential integrity (RI).

I. INTRODUCTION

The problem of materialized views maintenance is very important because views have wide application in data warehousing. A view is derived relation in terms of base relation [5]. View is said to be materialized when the tuples of views are stored in the data warehouse and results are shown without recomputation of view.

When an update occurs and the data at the source changes, the materialized view needs to be updated accordingly so that data at materialized view may be consistent with the data at source, this is called maintenance of materialized views.

There are two approaches to update materialized views when changes occur at the data source. First, we access the source data to identify the change and then recompute materialized views according to that change. Problem with first approach is that it may be too expensive to access the data from the data sources or may be data source is un-available at that time. Second approach to maintenance is usage of self-maintainability. We define self- maintainability as when there is change at the data source, materialized views will be updated using only materialized views and the update. One approach to self- maintainability is to replicate all base data at data warehouse but this approach requires very large storage space and maintenance cost.

Another approach to self- maintainability is to design and place some additional data at the data warehouse. This additional data can be in the form of auxiliary views. Now, challenge is to find most economical auxiliary views in terms of space complexity so that minimal auxiliary views are required such that together MV and AVs are self-maintainable.

A.Related Work

Problem of self-maintenance of materialized view has been discussed in [1], [2], [3] and [4]. Inconsistencies occur at the data warehouse because changes at the data source are dynamic. To avoid these inconsistencies, materialized views should be self-maintainable. Self-maintenance can be achieved either by replicating all base data entirely at the data warehouse or by maintaining auxiliary views. Minimizing space and cost of AV is still a research issue [1]. There are many other research areas which still need the attention of the researchers such as update filtering, self-maintainability and multiple view optimization. These problems need to be solved for flexible, powerful and efficient data warehousing. We can use certain shared sub-views to get efficiency but it should be balanced with slow-query response as there are fewer views since some view may not be fully materialized [2]. An algorithm proposed in [3] used idea of information sharing between different auxiliary views so that the number of auxiliary views can be minimal. We improved this approach in our research by using key and referential constraints which further reduces the number of tuples in auxiliary views.

Key and referential integrity constraints are helpful to minimize the number of tuples of auxiliary views discussed in [4].

B. Our Contribution

Algorithm discussed in [3] finds minimum number of auxiliary views in AV set. We improve this approach by

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considering key and referential constraints. When key and referential constraints are used, total number of tuples in AVs will be reduced which further reduces total space occupied by AVs (detail described in section 2.2).
Algorithm discussed in [3] finds set of auxiliary views only through local selection conditions (detail in section 2.1), which are enough to maintain the materialized views but this approach does not take key or referential constraints into considerations. We will find auxiliary views by using RI constraints described in [4] to further reduce the size of auxiliary views in terms of tuples (detail in section 3)

C. Paper Outline

Section 2 gives preliminary information and assumptions. Section 3 presents the algorithm that finds minimal auxiliary views set with minimal number of tuples and that set is sufficient for self-maintainability of views. Conclusion is given in section 4.

II. PRELIMINARIES

A.Local Selection Condition

Local selection conditions are those conditions which include attributes from a single relation as opposed to those involving conditions from different relations. When local reduction rule is applied on R_i by pushing local selection conditions, results in views are significantly reduced because those tuples that does not pass local selection condition in R_i ,does not contribute into views [3].

B. Finding Auxiliary Views By Considering Key and Referential Integrity Constraints

We present an example here that will show how we can reduce the number of tuples for auxiliary views needed for the self-maintainability of the views.
We are considering a database of students that has four base relations:-

Department (Dep_no, Dep_name, HOD_name)
Student (Roll_no, Name, CNIC, FSc_Marks, Dep_no)
Courses (Course_code, Course_name, Session, Dep_no)
Results (Result_id, Roll_no, Course_code, GPA)

Each relation has one attribute as a primary key that uniquely identifies records in the relation. In addition, some of these relations have foreign keys which are referenced by another table's primary key. Following Referential integrity constraints holds :

From Student.Dep_no to Department.Dep_no
From Course.Dep_no to Department.Dep_no
From Result.Roll_no to Student.Roll_no
From Result.Course_code to Course.Course_code

Suppose that we maintain a view which contains "Results of students from department of IT, whose session is 2010-2014 along with their name, roll no, course code, GPA and their HOD name".

```
CREATE VIEW results_IT AS
SELECT Department.Dep_no, Department.HOD_name,
Student.name, Student.Roll_no, Course.Course_code,
Student.GPA , Course.Course_name,
FROM Department, Student, Courses, Results
        WHERE Result.Course_code= Course.Course_code
                              and
         Course.Dep_no = Department.Dep_no and
        Result.Roll_no = Student.Roll_no      and
        Student.Dep_no= Department.Dep_no  and
        Course.session = 2010-2014            and
        Department.Dep_name = 'IT'
```

If we have a view such as above, we have to find such auxiliary views that make data warehouse self-maintainable when insertions are made at base tables. Following is the description of these auxiliary views:

```
CREATE VIEW aux_dept1 AS
SELECT Dep_no, HOD_name
FROM Departmet
WHERE Dep_name='IT';
```

```
CREATE VIEW aux_std1 AS
SELECT Roll_no, name
FROM Student
WHERE Dep_no IN(SELECT Dep_no FROM
aux_dept1)
```

```
CREATE VIEW aux_course1 AS
SELECT Course_code, Course_name
FROM Courses
WHERE session = 2010-2014 and Dep_no IN (SELECT
Dep_no FROM aux_dept1)
```

Figure1: Auxiliary views for maintaining the results_IT view

Figure 1 shows three auxiliary views aux_dept1, aux_std1 and aux_course1 which have been derived from view results_IT. Purpose of these auxiliary views is to maintain the view results_IT when there are some insertions at the source tables. Referential integrity constraints on base relations assure that these three auxiliary views are adequate to maintain results_IT view. There are four base relations in Table1, which contain the number of tuples listed in column 1. Assuming that the selectivity of the Department.Dep_name =0.04 and selectivity of the Course.session=0.05 and that distribution is unvarying. Second column of the Table 1 represents those tuples that pass local selection conditions (section 2.1).We took referential integrity constraints into considerations to further improve the results. Third column of Table 1 shows the results of our approach. According to our example, we did not materialize any tuple from Results table because RI constraints assure that existing tuples in Result cannot join

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with insertions in other relations due to which total number of AVs will also be reduced.

When we materialized these auxiliary views, it presented the significant saving of space over base relations. As illustrated in Table1.

Table 1: Number of tuples for results_IT view

Base Relation	Tuple in Base Relation	Tuples passing local selection condition	Tuples in auxiliary views
Department	25	1	1
Student	3000	3000	120
Courses	1000	50	2
Result	1500	1500	0
Total	5525	4551	123

These results are shown graphically below:-

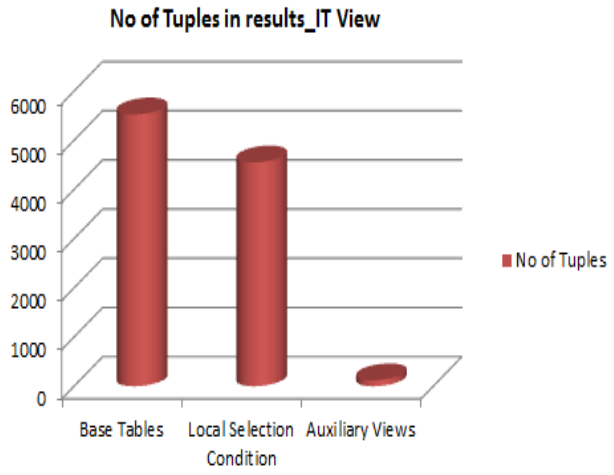

Figure 2: Number of tuples for results_IT view

Now we describe the second view result_BBA which will maintain the results of BBA Department i.e Results of students from department of BBA, whose session is 2010-2014 along with their department name, department number, student name, roll no, FSc marks, course code, GPA and HOD name.

CREATE VIEW results_BBA AS
SELECT Department.Dep_no, Department.HOD_name, Department.Dep_name, Student.name, Student.Roll_no, Student.FSc_marks, Student.Course_code, Student.GPA
FROM Department, Student, Courses, Results
WHERE
Result.Course_code = Course.Course_code and
Course.Dep_no = Department.Dep_no and
Result.Roll_no = Student.Roll_no and
Student.Dep_no = Department.Dep_no and
Course.session = 2010-2014 and
Department.Dep_name = 'BBA'

```
CREATE VIEW aux_dept2 AS
SELECT Dep_no, HOD_name
FROM Departmet
WHERE Dep_name='BBA';
```

```
CREATE VIEW aux_std2 AS
SELECT Roll_no, name
FROM Student
WHERE Dep_no IN(SELECT Dep_no FROM aux_dept2)
```

```
CREATE VIEW aux_course2 AS
SELECT Course_code, Course_name
FROM Courses
WHERE session = 2010-2014 and Dep_no IN (SELECT Dep_no FROM aux_dept2)
```

Figure 3: Auxiliary views for maintaining the results_BBA view

Figure 3 shows three auxiliary views derived from the view results_BBA. According to our example, three auxiliary views are sufficient to maintain results_BBA view. When we materialized the auxiliary views, it presents the significant saving over base relations. Referential constraints on base relations assure that these three auxiliary views are adequate to maintain results_BBA view. As illustrated in Table 2

Table 2: Number of tuples for results_BBA view

Base relation	Tuple in Base Relation	Tuple passing local selection condition	Tuple in auxiliary views
Department	25	1	1
Student	3000	3000	120
Courses	1000	100	4
Result	1500	1500	0
Total	5525	4551	125

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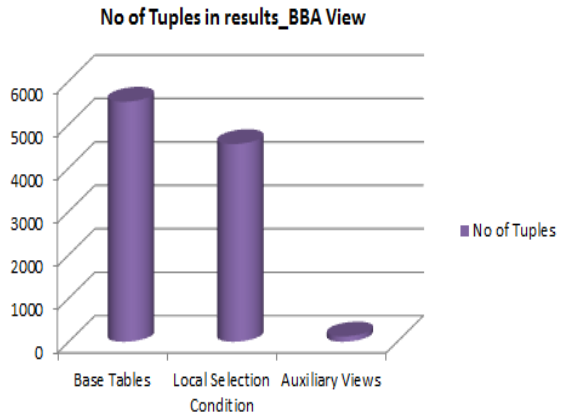

Figure 4: Number of tuples for results_BBA view

C .Gluing Operation

Gluing operation is applied on two views in order to merge them in to single view. This operation was described in [3]. Here we give only basic overview of this operation. Suppose, there is a relation R, let A and B be the two subsets of R (there may or may not some common attributes in the A and B). Let V1 and V2 be the two views derived from R such that $V1=\pi A^{\sigma} C1$ and $V2= \pi A^{\sigma} C2$ .the gluing operation will find a view V12 that is also derived from R .Our former views V1 and V2 can be derived from our new view V12. Clearly, $V12= \pi AUB^{\sigma} C12$ where $C12=C1 \vee C2$.

III. PROPOSED ALGORITHM

Input: A set of two materialized views called *'V'*
Output: A set of auxiliary views *'A'*that has minimal number of tuples in auxiliary views.

1 First develop two separate AV sets A1 $\{A^1_{R1}, A^1_{R2,\ldots} A^1_{Rn}\}$ and A2 $\{A^2_{R1}, A^2_{R2,\ldots} A^2_{Rn}\}$for two views V1 and V2 by taking key and referential constraints into consideration described in section 2.2.
2 *A:*{}initial AV set
3 Suppose total number of relations in V1 and V2 aren
for i=1 to n
Let A_{Ri}be the resulting view by joiningA_{Ri}^1 and A_{Ri}^2through gluing operation..
letCi be the number of tuples of A_{Ri}
letn_{ij} and b_{ij} be the number of tuples and bytes per tuple in A^J_{Ri}
let $B_i$be the total number of bytes per tuple in B∩C
Note: B and C are the subset of attributes of and $A_{Ri}^1$and A_{Ri}^2
If $Ci(b_{ij}+b_{ij}-B_i) \leq (n_{i1}b_{i1}+n_{i2}b_{i2})$
then
A:= AU(A_{Ri})
else
A:=$\{A_{Ri}^1, A_{Ri}^2\}$
end if
end for

A.How Algorithm Works

We take our above example to show that how algorithm works. We have two views, one for maintaining the results of IT students along with some of their basic information and second view is for maintaining the results of BBA students.

Both views have their own set of auxiliary views for maintaining views, which we have found using key and referential constraints in first step of our algorithm.

We assume that initial auxiliary view set is empty and we have three auxiliary views in each auxiliary view set. AVs from both sets will be merged in to one AV by using gluing operation. If size of resulting AV is smaller (in terms of tuples and bytes) than two separate AVs ,then it will be included in AV set otherwise two separate AVs will be included in AV set . This algorithm will output a new auxiliary view set which will significantly take less space.
Now we consider an example (section 2.2) to describe our final results.
We have two AV sets.

AV1 {aux_dept1, aux_std1, aux_course1}
AV2 {aux_dept2, aux_std2, aux_course2}

After applying algorithm, we have

AV12{aux_Dep12, aux_Std12, aux_Course12}

Total number of tuples in these AV12 are listed below

TABLE 3: NUMBER OF TUPLES WITHOUT REFERENTIAL CONSTRAINTS

aux_Dep12	*aux_Std12*	*aux_Course12*	*Total*
2	6000	200	6202

Table 3 shows the results of algorithm when we did not consider referential constraints, and when we took referential constraints into account, the number of tuples in auxiliary views are significantly reduced as we can clearly see in table 4.

TABLE 4: NUMBER OF TUPLES WITH REFERENTIAL CONSTRAINTS

aux_Dep12	*aux_Std12*	*aux_Cours12*	*Total*
2	240	8	250

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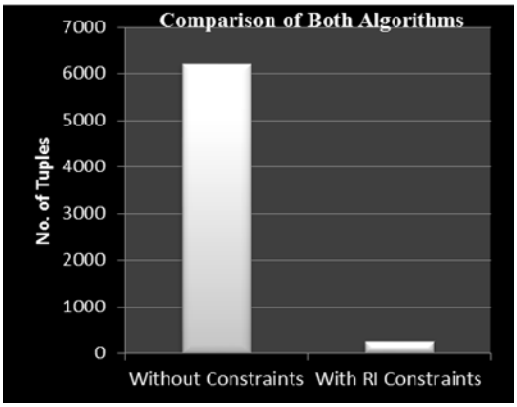

Figure 5: Number of tuples in auxiliary view set without and with using RI constraints

Figure 5 shows the results of applying algorithm to results_BBA and results_IT view. When we did not use referential constraints in finding auxiliary view set, total number of tuples are above 6000 and when we used referential constraints we have 250 tuples.

1V. Conclusion and Future Work

We studied the issue of self-maintainability in this research and devised an algorithm that takes RI constraints into consideration and returns the set of auxiliary view which have minimal number of tuples. In our future work, we will consider effect of key and referential constraints upon deletions at the data sources.

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Heart Disease Diagnosis by Using FFBP and GRNN Algorithm of Neural Network

Shaikh Abdul Hannan
Department of Computer Science and IT, Albaha University, Albaha, Saudi Arabia

Abstract
An expert system is a computer program that simulates the thought process of a human expert to solve complex decision problems. The growth of expert systems is expected to continue for several years. In the last two decades, the use of Neural Network in medical analysis is increasing. This is mainly because the classification and detection system have improved a great deal to help the medical experts in diagnosing. Heart disease affects millions of people every year. As clinical decision making inherently requires reasoning under uncertainty, expert system and Neural Network technique are suitable for dealing with partial evidence. Medical trainee doctors other than specialist may not have enough expertise or experience to deal with certain high risk diseases. With this system the patients with high risk factors can recover. In this paper, the detail about patient data collection procedure, coding, normalization and tabulation is given. The experiments are perform on data collected using Feed-forward Backpropagation. -- In this work around 300 patients information has been collected from Sahara Hospital, Aurangabad under the observation of Dr. Abdul Jabbar. For data collection of 350 patients around 9 months has spend by sitting in OPD of Hospital along with concerned doctor. The final coded, normalized and tabulated data and results has been verified by Dr. Abdul Jabbar and is satisfied with the result.

Keywords: Expert System, ANN (Artificial Neural network), FFBP (Feed forward backpropagation algorithm), Generalized Regression Neural Network, Medicine, Symptoms.

1. Introduction

Nowadays the use of computer technology in the fields of medicine area diagnosis and treatment of illnesses and patient pursuit has highly increased. Despite the fact that these fields, in which the computers are used, have very high complexity and uncertainty, the use of intelligent systems such as fuzzy logic, artificial neural network and genetic algorithm have been developed. Heart diseases factor is the most common diseases in human beings. For this reason, heart disease in necessary medical research area. Early heart diseases problem is very critical. Heart diseases may is suspected if the heart sound heard through stethoscope are abnormal this usually the first step in diagnosing a heart diseases to further define the type of heart diseases physician may use Electro Cardio Gram **(**ECG), Chest X-ray Cardiac catheterization, Magnetic resonance Imaging (MRI) all these methods based on experience and information of physician. In this manner, the cardiologist can understand the output of examination system more easily and the diagnose the problem more accurately [1][4][5] [7][9][12].

The heart consists of four chambers, two atria and two ventricles. There is a value through which blood passes before leaving each chamber of the heart. These valves are actual flaps that are located on each end of the two ventricles. Heart disease is when one or more valves in the heart are not work fully and blood do not flow through heart properly. This can put an extra stress the heart and cause Symptoms such as breathlessness and sweating.

The term heart disease actually applies to a number of illnesses that affect the circulatory system, which consists of heart and blood vessels. It is intended to deal here only with the condition commonly called "Heart Attack" and the factors, which lead to such condition. Heart attack is the popular term for sudden pain in chest with breathing difficulty arising out of certain heart conditions. Heart attacks can be suddenly fatal, but the great majority- an estimated 85 percent are not. The patient recovers under proper treatment and goes on to live many useful years [2][3] [6] [8] [10][13].

1.1 Some Early Signs Of The Heart Trouble

It has been said earlier that any disturbance in the supply of blood to heart muscle leads to its functional impairment.
It will be useful to discuss here such factors, which may lead to disturbances in the supply of blood to heart muscles. Certain conditions increase the strains on the heart. Among these are lack of rest, over exertion or prolonged hard labor which create an excessive body demand for oxygen that the heart, muscle must supply through pumping more blood. If the blood vessels are inelastic on account of arteriosclerosis fibrous thickening or narrowing of passage (atherosclerosis) additional work on the part of the heart will be needed to push blood through these vessels. Other indirect factors that may result in causing disturbance in blood supply are indigestion of food, anger and other emotional excitements.

1.2 A Feed-forward backpropagation algorithm:-

A feed-forward neural network is similar to the types of neural networks that we have already examined. Just like many other types of neural networks, the feed-forward neural network begins with an input layer. The input layer may be connected to a hidden layer or directly to the output layer. If it is connected to a hidden layer, the hidden layer can then be connected to another hidden layer or directly to the output layer. There can be any number of hidden layers, as long as there is at least one hidden layer or output layer provided. In common use, most neural networks will have one hidden

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layer, and it is very rare for a neural network to have more than two hidden layers.

1.3 The Structure of a Feed-forward Neural Network

Figure 1 illustrates a typical feed-forward neural network with a single hidden layer.

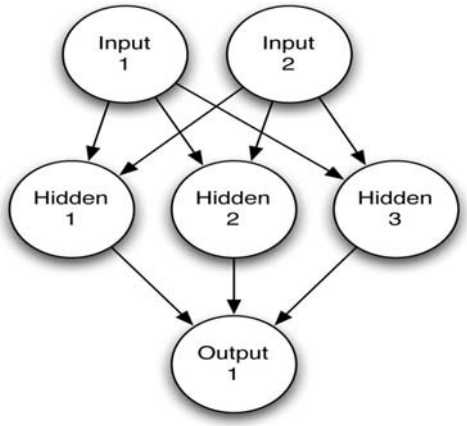

Figure 1: A typical feed-forward neural network

Neural networks with more than two hidden layers are uncommon.

1) Choosing Your Network Structure

There are many techniques for choosing these parameters.

2) The Input Layer

Once a pattern is presented to the input layer, the output layer will produce another pattern. In essence, this is all the neural network does. The input layer should represent the condition for which we are training the neural network. Every input neuron should represent some independent variable that has an influence over the output of the neural network.

3) The Output Layer

The output layer of the neural network is what actually presents a pattern to the external environment. The pattern presented by the output layer can be directly traced back to the input layer. The number of output neurons should be directly related to the type of work that the neural network is to perform.

To determine the number of neurons to use in your output layer, you must first consider the intended use of the neural network. If the neural network is to be used to classify items into groups, then it is often preferable to have one output neuron for each group that input items are to be assigned into.[17]

2. Generalized Regression Neural Network

A GRNN is a variation of the radial basis neural networks, which is based on kernel regression networks [18–20]. A GRNN does not require an iterative training procedure as back propagation networks. It approximates any arbitrary function between input and output vectors, drawing the function estimate directly from the training data. In addition, it is consistent that as the training set size becomes large, the estimation error approaches zero, with only mild restrictions on the function [20].

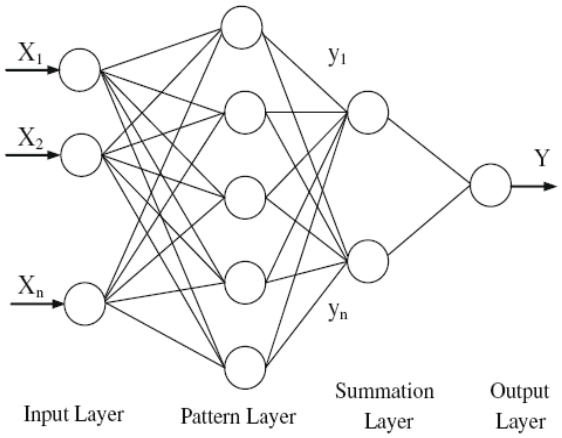

Fig. 2 General Structure of GRNN

A GRNN consists of four layers: input layer, pattern layer, summation layer and output layer as shown in Fig. 2. The number of input units in input layer depends on the total number of the observation parameters. The first layer is connected to the pattern layer and in this layer each neuron presents a training pattern and its output. The pattern layer is connected to the summation layer. The summation layer has two different types of summation, which are a single division unit and summation units. The summation and output layer together perform a normalization of output set. In training of network, radial basis and linear activation functions are used in hidden and output layers. Each pattern layer unit is connected to the two neurons in the summation layer, S and D summation neurons. S summation neuron computes the sum of weighted responses of the pattern layer. On the other hand, D summation neuron is used to calculate unweighted outputs of pattern neurons. The output layer merely divides the output of each S-summation neuron by that of each D-summation neuron, yielding the predicted value Y0i to an unknown input vector x as [13];

$$Y_i' = \frac{\sum_{i=1}^{n} y_i . \exp\ -D(x, x_i)}{\sum_{i=1}^{n} \exp\ -D(x, x_i)|}$$

$$D(x, x_i) = \sum_{k=1}^{m} (\frac{x_i - x_{ik}}{\sigma})^2$$

yi is the weight connection between the ith neuron in the pattern layer and the S-summation neuron, n is the number of the training patterns, D is the Gaussian function, m is the number of elements of an input vector, xk and xik are the jth element of x and xi, respectively, r is the spread parameter, whose optimal value is determined experimentally.

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3.1 Preparation of Medicine Data

The data is collected from Sahara Hospital, Roshan Gate, Aurangabad under supervision of Dr. Abdul Jabbar. I have visited the Hospital for OPD session daily while doctor examining the patients. The symptoms and information about patients details like Previous History, Present History, Personnel History, Physical Examination, Cardio Vascular System, Respiratory rate, Per Abdomen, Central Nervous system, ECG and Blood Investigation. The main point is ECG from which the patient can easily diagnose whether the patient is having heart problem or not.

The all 150 patients data collected regarding heart disease and the data are prepared in different Excel Sheets which contains codes of each individual disease, history and symptoms. In one excel sheet 13 sub-sheets are taken for each field of information such as for Previous History one sub-sheet has taken and given the name is given (P1), for Present History the second sub-sheet and the name is given (P2), for Personnel History the third sheet is taken and the name is given (P3), like this total 13 different sheets for different fields. All the fields are taken under the supervision of the Cardiologist, Dr. Abdul Jabbar.

The code is given to each symptoms, physical examination parameter or diseases in each sub-sheet for experimental work. On this data some pre-processing i.e. normalization, coding and decoding methods are applied for the expected output.

In one excel sub-sheet for Previous History (P1) and the diseases present in P1 are represented by Codes. The code 1 which represents Hypertension, Code 2 represents Diabetes like these 18 different diseases are found and specified 1 to 18 codes for each disease in different 150 heart patients. Some of them are as shown in Table 1.

Code	Name of Disease
6	Hypothyrodism
7	Old Ischaemic heart disease
8	Nil
9	Interstitial Lung disease (ILD)
10	Cerebrovascular Accident(CVA)

In next excel sub-sheet Present History (P2) and the information present in P2 are represented by Codes. The Code 1 which represents Chest Pain/Discomfort, Code 2 represents Restrosternal Pain like these 29 different symptoms are found in all patients and specified 1 to 29 codes for each symptom. Some of the symptoms are shown in table 2.

Code	Symptoms
6	Perspiration
7	Giddiness
8	Nausea / Vomiting
9	Epigastric Pain
10	Left Arm pain

Table 2 : Present History of patients

In next excel sub-sheet Personnel History (P3) and the information present in P3 are represented by codes for different bad habits. The Code 1 which represents Smoking, Code 2 represents Tobacco like these 4 different bad habits are taken and specified by 1 to 4 codes. Some of the personnel history parameters are given below.

Code	Personnel History
1	Smoking
2	Tobacco
3	Alcohol
4	Nil

Table 3 : Personnel History

In next excel sub-sheet Physical Examination (P4) and the information present in P4 are represented by codes for different physical parameters. The Code 1 which represents Consciousness, Code 2 represents Orientation like these 25 different physical parameters and specified by 1 to 25 codes for each parameter. Some are as shown below in table 4.

Code	Physical Examination
6	Normal Pulse rate
7	**High Pulse rate**
8	Low systolic Blood Pressure
9	Normal Blood Pressure
10	**High Blood Pressure**

Table 4 : Physical Examination

In next excel sub-sheet Cardio Vascular System (CVS) and the information present in CVS are represented by codes for different symptoms. The Code 1 which represents Heart Sound, Code 2 represents Normal Heart Rate like this 8 different symptoms and specified by 1 to 8 codes for each symptom. Some are as shown below in table 5.

Code	Symptoms
4	Bradycardia
5	Regular Heart Rhythm
6	Irregular Heart Rhythm
7	Gallop sound
8	No Abnormality Detected (NAD)

Table 5 : Cardio Vascular System

In next excel sub-sheet Respiratory System (RS) and the information present in RS are represented by codes for different symptoms. The Code 1 which represents Breath Sound preserved, Code 2 represents Breath Sound Reduced like this 5 different symptoms are found and specified by 1 to 5 codes for each symptoms. Some are as shown below in table 6.

Code	Symptoms
1	Breath Sounds Preserved
2	Breath Sound Reduced
3	Basal Crepts
4	No Abnormality Detected (NAD)
5	Ranchi

Table 6 : Respiratory System

In next excel sub-sheet Per-Abdomen (PA) and the information present in PA are represented by codes for different symptoms. The Code 1 which represents Liver (Hepatomegaly), Code 2 represents Spleen (Splenomegaly)

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like these 6 different symptoms have found and specified by 1 to 6 codes for each symptom. Some are as shown below in table 7.

Code	Symptoms
2	Spleen (Spleenomegaly)
3	Free Fluid Present
4	Abdominal Distension
5	No Abnormality Detected (NAD)
6	Obesity

Table 7 : Per Abdomen

In next excel sub-sheet Central Nervous System (CNS) and the information present in CNS are represented by codes for different symptoms. The Code 1 which represents Consciousness, Code 2 represents Orientation like this 5 different symptoms are found and specified by 1 to 5 codes for each symptom. Some are as shown below in table 8.

Code	Symptoms
1	Consciousness
2	Orientation
3	Focal Deficit
4	No Abnormality Detected (NAD)
5	Restlessness

Table 8 : Central Nervous System

In next excel sub-sheet Electro Cardio Gram (ECG) and the information present in ECG are represented through codes for different finding which points to different problems of heart. The Code 1 which represents ST Elevation, Code 2 represents Anterior Wall like this 21 different heart findings are found and specified by 1 to 21 codes for each finding. Some are as shown below in table 9.

Code	ECG Point
6	Lateral
7	Septal
8	High Lateral
9	T Wave inversion
10	ST Depression

Table 9 : Electro Cardio Gram (ECG)

I next excel sub-sheet Blood Investigation (BI) and the information present in BI are represented through codes for blood investigation. The Code 1 which represents Cardiac Enzymes (High), Code 2 represents Blood Sugar Test like this 24 different investigations has found and specified by 1 to 24 codes for each investigation in all patient.

Code	Symptoms
6	Lipid Profile normal
7	Lipid Profile Abnormal
8	Complete Blood Count Normal
9	Leucocytosis
10	Anaemia

Table 10 : Blood Investigation

In next excel sub-sheet all the medicines names along with their codes i.e. MID which are prescribed by the doctor to the patients. The medicine sheet contains 52 different medicines which are prescribed by the doctor in different 150 stages. Some are as shown below in table 11.

Code	Medicine Name
6	Clopidogrel
7	Digoxin
8	Diltiazem
9	Diphenylhydantoin Sodium
10	Enalapril

Table 11 : Medicine Names

In next excel sub-sheet all Patients information such as P1, P2, P3, P4, CVS, RS, PA, CNS, ECG and BI which contains all the represented codes that are present in the individual patients.

Sr. No.	Patient Name	Symptoms and Findings										
		Age	P1	P2	P3	P4	CVS	RS	PA	CNS	ECG	BT
6	A	33M	8	1,4	1	6,10	8	4	5	4	3	2
7	B	60 M	1	15,3,4	4	6,10,12	8	4	5	4	9	14
8	C	60M	1,7	1,17	4	6,9	6	4	5	4	9	9
9	D	50M	7	18	4	3,7,9,16	3	3	1	4	11,3	14
10	E	60F	9,2,3	4	4	7,9,13,18	3	3,5	5	4	11.3	9,10,4

Table 12 : collection of different details of the individual Heart Patients

Next excel sub-sheet all the medicines prescribed by the doctor to the individual patients.

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Sr. No.	Patient Name	MID 1	MID 2	MID 3	MID 4	MID 5	MID 6	MID 7	MID 8	MID 9	MID 10	MID 11	MID 12	MID 13
6	A	25	6	3	29	5	17	1	21	16				
7	B	14	3	5	6	1	26							
8	C	29	1	3	5	25	17	16	27	24				
9	D	32	11	20	11	14	33							
10	E	14	11	34	3	5	33	35	24					

Table 13 : All the Medicine codes provided by the doctor to the individual patients.

4. Experimental Analysis :

For further neural network process the proposed information coded in binary form (0 or 1). If the symptom is present in the patients at particular number at that point it is defined by one (1) and if it is absent at that location it is placed by Zero (0). Suppose for example in the field P2 (present history) there are total 29 symptoms are present and the patient one is having the symptom 1,2,5 and 13 so at that location it is defined by 1 (one) and all other symptoms are 0 (zero). In such a way all the fields are defined. All the parameter that we consider in medical prescription like Sr. No., ,age , P1, P2,P3,P4,CVS, RS,PA,CNS,ECG and BT that converted in binary number where this is used in neural network for train the neurons for better result.

The individual data of the patient one is define in binary form as,

Sr **No** **Age** **P1** **P2** **P3**
00000001 0110111 00000010000000000 10010000000100000000000000000 1000
P4 **CVS** **RS** **PA** **CNS** **ECG**
00000100010000000000000000 00000001 00010 000010 00010 00100000000000000000
BT
01000000000000000000000;

Symptoms and Information Coding of the patient 1.

For this system total 52 medicine are prescribed by the Doctor and if the medicine is present is defined by one (1) and if it is absent at that location it is defined by Zero(0). Similarly for patient one the prescribe medicine are defined by,

0 1 1 0 1 1 0 0 0 0 0 0 0 1 0 0 1 0 1 0 1 0 1 0 1 1 1 0 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0;

Medicine Coding of the patient 1.

5.1 Discussion of First five patients results with doctor :

Original Medicines given by doctor :

A) 1,3,5,6,14.17,19,21,23,25,26,27,29,36
B) 2,3,5,6,14,16,17,21,23,25,26,27,28
C) 1,5,6,14,25
D) 3,5,7,10,11,13,14,17,19,30
E) 3,14,15,19

Medicines given by the Expert system using FFBP

A) 1,3,5,6, 14, 16, 17,21,23,25,26,27,28
B) 1,3,5,6,14,25
C) 1,3,5,6,14,25
D) 1,3,5,6,14,25
E) 1,3,5,6,14,25

Medicines given by the Expert system using GRNN

A) 1,3,5,6, 16,1718,21,23,25,26,27,28,29
B) 1,3,5,6,16,17,18,21,23,25,26,27,28,29
C) 1,3,5,6,11,14,21,22,23,24,25,26,27
D) 1,3,5,6,13,14,17,2122,23,25,26,27,28
E) 1,2,3,5,14.

6. Conclusion: In this paper, around 300 patient's information is collected from Sahara Hospital, under supervision of Dr. Abdul Jabbar, (MD Medicine) Sahara Hospital, Roshan Gate, Aurangabad. The collected information is coded, normalized and entered into 13 different excel sub-sheets. All the patients data is trained by using GRNN and FFBP. Around 50 samples were tested with these two techniques. If the more data set is used for the training the NN model gives more robust results. The analysis model by using FFBP and GRNN of ANN gives less appropriate result for medical prescription for heart disease patient. However, there are several techniques that can improve the speed and performance of the back propagation algorithm, weight initialization, use of momentum and adaptive learning rate.

The analysis model by using GRNN and FFBP of ANN gives less appropriate result for medical prescription for heart disease patient. However, there are several techniques that can improve the speed and performance of the back propagation algorithm, weight initialization, use of momentum and adaptive learning rate. It is found that the result of testing data

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by using GRNN and FFBP is not satisfactory as per the result verified by the doctor. In future, this work may be extend using Quasi Newton's Algorithm for satisfactory result so that this expert system can be useful for the trainee as well as those who are not expert in the heart diseases.

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Mr. Vishal Goyal, Department of Computer Science, Punjabi University, India
Dr. R. Baskaran, Department of Computer Science and Engineering, Anna University, Chennai
Assist. Prof, Kanwalvir Singh Dhindsa, B.B.S.B.Engg.College, Fatehgarh Sahib (Punjab), India
Dr. Jamal Ahmad Dargham, School of Engineering and Information Technology, Universiti Malaysia Sabah
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Mr. Noor Muhammed Nayeem, Université Lumière Lyon 2, 69007 Lyon, France
Dr. Himanshu Aggarwal, Department of Computer Engineering, Punjabi University, India
Prof R. Naidoo, Dept of Mathematics/Center for Advanced Computer Modelling, Durban University of Technology, Durban,South Africa
Prof. Mydhili K Nair, M S Ramaiah Institute of Technology(M.S.R.I.T), Affliliated to Visweswaraiah Technological University, Bangalore, India
M. Prabu, Adhiyamaan College of Engineering/Anna University, India
Mr. Swakkhar Shatabda, Department of Computer Science and Engineering, United International University, Bangladesh
Dr. Abdur Rashid Khan, ICIT, Gomal University, Dera Ismail Khan, Pakistan
Mr. H. Abdul Shabeer, I-Nautix Technologies,Chennai, India
Dr. M. Aramudhan, Perunthalaivar Kamarajar Institute of Engineering and Technology, India
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Track A: Security

Access control, Anonymity, Audit and audit reduction & Authentication and authorization, Applied cryptography, Cryptanalysis, Digital Signatures, Biometric security, Boundary control devices, Certification and accreditation, Cross-layer design for security, Security & Network Management, Data and system integrity, Database security, Defensive information warfare, Denial of service protection, Intrusion Detection, Anti-malware, Distributed systems security, Electronic commerce, E-mail security, Spam, Phishing, E-mail fraud, Virus, worms, Trojan Protection, Grid security, Information hiding and watermarking & Information survivability, Insider threat protection, Integrity
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Location Anonymity schemes, Intrusion detection and prevention techniques, Cryptography, encryption algorithms and Key management schemes, Secure routing schemes, Secure neighbor discovery and localization, Trust establishment and maintenance, Confidentiality and data integrity, Security architectures, deployments and solutions, Emerging threats to cloud-based services, Security model for new services, Cloud-aware web service security, Information hiding in Cloud Computing, Securing distributed data storage in cloud, Security, privacy and trust in mobile computing systems and applications, **Middleware security & Security features:** middleware software is an asset on
its own and has to be protected, interaction between security-specific and other middleware features, e.g., context-awareness, **Middleware-level security monitoring and measurement:** metrics and mechanisms for quantification and evaluation of security enforced by the middleware, **Security co-design:** trade-off and co-design between application-based and middleware-based security, **Policy-based management:** innovative support for policy-based definition and enforcement of security concerns, **Identification and authentication mechanisms:** Means to capture application specific constraints in defining and enforcing access control rules, **Middleware-oriented security patterns:** identification of patterns for sound, reusable security, **Security in aspect-based middleware:** mechanisms for isolating and enforcing security aspects, **Security in agent-based platforms:** protection for mobile code and platforms, Smart Devices: Biometrics, National ID cards, Embedded Systems Security and TPMs, RFID Systems Security, Smart Card Security, Pervasive Systems: Digital Rights Management (DRM) in pervasive environments, Intrusion Detection and Information Filtering, Localization Systems Security (Tracking of People and Goods), Mobile Commerce Security, Privacy Enhancing Technologies, Security Protocols (for Identification and Authentication, Confidentiality and Privacy, and Integrity), Ubiquitous Networks: Ad Hoc Networks Security, Delay-Tolerant Network Security, Domestic Network Security, Peer-to-Peer Networks Security, Security Issues in Mobile and Ubiquitous Networks, Security of GSM/GPRS/UMTS Systems, Sensor Networks Security, Vehicular Network Security, Wireless Communication Security: Bluetooth, NFC, WiFi, WiMAX, WiMedia, others

This Track will emphasize the design, implementation, management and applications of computer communications, networks and services. Topics of mostly theoretical nature are also welcome, provided there is clear practical potential in applying the results of such work.

Track B: Computer Science

Broadband wireless technologies: LTE, WiMAX, WiRAN, HSDPA, HSUPA, Resource allocation and interference management, Quality of service and scheduling methods, Capacity planning and dimensioning, Cross-layer design and Physical layer based issue, Interworking architecture and interoperability, Relay assisted and cooperative communications, Location and provisioning and mobility management, Call admission and flow/congestion control, Performance optimization, Channel capacity modeling and analysis, Middleware Issues: Event-based, publish/subscribe, and message-oriented middleware, Reconfigurable, adaptable, and reflective middleware approaches, Middleware solutions for reliability, fault tolerance, and quality-of-service, Scalability of middleware, Context-aware middleware, Autonomic and self-managing middleware, Evaluation techniques for middleware solutions, Formal methods and tools for designing, verifying, and evaluating, middleware, Software engineering techniques for middleware, Service oriented middleware, Agent-based middleware, Security middleware, Network Applications: Network-based automation, Cloud applications, Ubiquitous and pervasive applications, Collaborative applications, RFID and sensor network applications, Mobile applications, Smart home applications, Infrastructure monitoring and control applications, Remote health monitoring, GPS and location-based applications, Networked vehicles applications, Alert applications, Embeded Computer System, Advanced Control Systems, and Intelligent Control : Advanced control and measurement, computer and microprocessor-based control, signal processing, estimation and identification techniques, application specific IC's, nonlinear and adaptive control, optimal and robot control, intelligent control, evolutionary computing, and intelligent systems, instrumentation subject to critical conditions, automotive, marine and aero-space control and all other control applications, Intelligent Control System, Wiring/Wireless Sensor, Signal Control System. Sensors, Actuators and Systems Integration : Intelligent sensors and actuators, multisensor fusion, sensor array and multi-channel processing, micro/nano technology, microsensors and microactuators, instrumentation electronics, MEMS and system integration, wireless sensor, Network Sensor, Hybrid

Sensor, Distributed Sensor Networks. Signal and Image Processing : Digital signal processing theory, methods, DSP implementation, speech processing, image and multidimensional signal processing, Image analysis and processing, Image and Multimedia applications, Real-time multimedia signal processing, Computer vision, Emerging signal processing areas, Remote Sensing, Signal processing in education. Industrial Informatics: Industrial applications of neural networks, fuzzy algorithms, Neuro-Fuzzy application, bioInformatics, real-time computer control, real-time information systems, human-machine interfaces, CAD/CAM/CAT/CIM, virtual reality, industrial communications, flexible manufacturing systems, industrial automated process, Data Storage Management, Harddisk control, Supply Chain Management, Logistics applications, Power plant automation, Drives automation. Information Technology, Management of Information System : Management information systems, Information Management, Nursing information management, Information System, Information Technology and their application, Data retrieval, Data Base Management, Decision analysis methods, Information processing, Operations research, E-Business, E-Commerce, E-Government, Computer Business, Security and risk management, Medical imaging, Biotechnology, Bio-Medicine, Computer-based information systems in health care, Changing Access to Patient Information, Healthcare Management Information Technology. Communication/Computer Network, Transportation Application : On-board diagnostics, Active safety systems, Communication systems, Wireless technology, Communication application, Navigation and Guidance, Vision-based applications, Speech interface, Sensor fusion, Networking theory and technologies, Transportation information, Autonomous vehicle, Vehicle application of affective computing, Advance Computing technology and their application : Broadband and intelligent networks, Data Mining, Data fusion, Computational intelligence, Information and data security, Information indexing and retrieval, Information processing, Information systems and applications, Internet applications and performances, Knowledge based systems, Knowledge management, Software Engineering, Decision making, Mobile networks and services, Network management and services, Neural Network, Fuzzy logics, Neuro-Fuzzy, Expert approaches, Innovation Technology and Management : Innovation and product development, Emerging advances in business and its applications, Creativity in Internet management and retailing, B2B and B2C management, Electronic transceiver device for Retail Marketing Industries, Facilities planning and management, Innovative pervasive computing applications, Programming paradigms for pervasive systems, Software evolution and maintenance in pervasive systems, Middleware services and agent technologies, Adaptive, autonomic and context-aware computing, Mobile/Wireless computing systems and services in pervasive computing, Energy-efficient and green pervasive computing, Communication architectures for pervasive computing, Ad hoc networks for pervasive communications, Pervasive opportunistic communications and applications, Enabling technologies for pervasive systems (e.g., wireless BAN, PAN), Positioning and tracking technologies, Sensors and RFID in pervasive systems, Multimodal sensing and context for pervasive applications, Pervasive sensing, perception and semantic interpretation, Smart devices and intelligent environments, Trust, security and privacy issues in pervasive systems, User interfaces and interaction models, Virtual immersive communications, Wearable computers, Standards and interfaces for pervasive computing environments, Social and economic models for pervasive systems, Active and Programmable Networks, Ad Hoc & Sensor Network, Congestion and/or Flow Control, Content Distribution, Grid Networking, High-speed Network Architectures, Internet Services and Applications, Optical Networks, Mobile and Wireless Networks, Network Modeling and Simulation, Multicast, Multimedia Communications, Network Control and Management, Network Protocols, Network Performance, Network Measurement, Peer to Peer and Overlay Networks, Quality of Service and Quality of Experience, Ubiquitous Networks, Crosscutting Themes – Internet Technologies, Infrastructure, Services and Applications; Open Source Tools, Open Models and Architectures; Security, Privacy and Trust; Navigation Systems, Location Based Services; Social Networks and Online Communities; ICT Convergence, Digital Economy and Digital Divide, Neural Networks, Pattern Recognition, Computer Vision, Advanced Computing Architectures and New Programming Models, Visualization and Virtual Reality as Applied to Computational Science, Computer Architecture and Embedded Systems, Technology in Education, Theoretical Computer Science, Computing Ethics, Computing Practices & Applications

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